Determinants of Inflation in India: A Study of Compositional Shift in the Post Reform Period

Thesis

Submitted to

Babasaheb Bhimrao Ambedkar University,

(A Central University)

Lucknow

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Dedicated
To My
Revered Parents

"O My Lord! Bestow Your Mercy on them as they Affectionately Reared me in Childhood"

(Al-Quran 17:24)

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ESTABLISHED 1996

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CERTIFICATE

This is to certify that the thesis entitled as **"Determinants of Inflation in India: A Study of Compositional Shift in the Post Reform Period"** submitted by **Naveed Ahmad Lone** is an original research work and has not been previously submitted in part or full for the award of any other degree or diploma to this or any other university.

This thesis submitted to Babasaheb Bhimrao Ambedkar University Lucknow satisfies all the due requirements as stipulated in the Doctor of Philosophy (PhD) regulations-1999 as amended in 2008/2010/2013….. and it is fit for the submission and evaluation for the award of Doctor of Philosophy of the University.

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DECLARATION

I hereby declare that the thesis entitled **"Determinants of Inflation in India: A Study of Compositional Shift in the Post Reform Period"** submitted in partial fulfilment for the degree of **Doctor of Philosophy** is an authentic record of original work carried out by me under the venerate supervision of Dr D. K Yadav, Assistant Professor Department of Economics, School for Ambedkar Studies, Babasaheb Bhimrao Ambedkar University (A Central University) Lucknow. I further declare that the contents of this thesis do not form any basis of the award of any previous degree to me or to any-body else to the best of my knowledge, and that the thesis has not been submitted by me for any research degree in any University or Institution. In keeping with the ethical practice in reporting research information due acknowledgements have been made wherever the findings of others have been cited.

This is being submitted to the Babasaheb Bhimrao Ambedkar University (A Central University) Lucknow, for the degree of Doctor of Philosophy in Economics.

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Naveed Ahmad Lone

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CHAPTER 1

Introduction

Introduction

Inflation has long been a concept that perplexes not only policy makers, politicians but the layman too both in developed as well as in developing nations. Perhaps this is the one of the most serious macroeconomic problems confronting the world economy today. It is the inflation that affects the common man (majority of the population) on a daily basis and therein lies its power. It is generally agreed that inflation is socially unjust. As is well known, it brings in its trail serious and far-reaching consequences of economic, social and political nature. Its immediate effect is to shift real income against the vast majority of the population. Inflation makes it more impossible for people of moderate means to provide for their old age and by destroying the middle class it creates a dangerous gap between the completely property-less and the wealthy. (F.A Hayek 1972). Inflation also affects the general economic behaviour and the patterns of resource allocation. By distorting price relation and underlying general confidence, prolonged inflation tends to direct investments away from strictly productive sector and thus slackens growth. Furthermore, it encourages the speculation among the various economic units and discourages the private saving. Thus, any continuous rise in prices is dangerous because once we begin to rely on its stimulating effects; we shall be committed to a course that will leave us no choice but that between more inflation, on one hand, and paying for our mistakes by a recession or depression, on the other hand. Although a small amount of inflation can be viewed as having a benefit on the economy, since it gives room for the central bankers to stimulate the economy and for the business men to increase the wheels of commerce (Groshen and Scweitzer, 1997). Because many prices are sticky downwards and tend to creep upwards, the effort to attain a zero inflation rate (a constant price level) pushes other sectors with falling prices, profits and employment. Efforts to attain complete price stability can also lead to deflation sine to set off positive inflation at some periods, negative inflation at some other periods are required. This is generally viewed negative by Keynesian because of downward adjustments in wages and output, and the difficulties faced in repaying nominal debt.

When inflation is more variable and less predictable the costs are very high particularly in the form of shoe leather costs, menu costs, relative price dissertations, tax distortions, and so on[1]. When inflation is low, there is a consensus that it should be kept low, so that the inflation is steady and predictable. When inflation is moderate or high, however, there is disagreement about the importance of reducing it; indeed, the cost of slightly greater inflation may appear small. As a result, inflation is variable and difficult to predict. Greater inflation variability increases uncertainty, lowers welfare, and increases the reluctance to undertake the projects. High inflation might be viewed by firms and individuals as a result of poor government performance. Inflation can also be viewed as a 'tax' since it reduces the purchasing power of the cash balances held by the private sector.

As it is clear that India is facing a high rate of inflation especially in the last few years and historically, from 1969 until 2012, India's inflation rate averaged 7.75 Percent. In the 2010-11 the average inflation rate was 9.55 percent as against the3.8 percent in 2009-10, and again in 2011-12 it reached up to 8.79 percent. In the post-reform period the inflation has shown dramatic changes as in the early reform period it was very high, in the mid-reform period it was moderate, and again from last few years it has shown an increasing trend. Different policies or policy instruments were introduced by the government but all in vain. It does not only affect the sectoral allocation and distribution of the income but also accentuates the poverty (World Bank 1990). Inflation is desirable if it is moderate and undesirable when it crosses certain limits (threshold level), then it leads to mainly income inequality, poverty, diversion of sectoral investment, etc. In the post-reform period, the most important concern is not only that it has crossed the acceptable level but also became uncertain and uncontrollable. And, the situation has gone worse, because the mainstream theory of inflation, particularly from past few years, has failed to explain the inflationary behaviour. As monetarists postulate that long term inflation is always associated with money growth and that control of it is necessary and sufficient to control inflation (Friedman 1968). Monetary policy guided by this logic and a record of 13-times hike in repo rate in a single fiscal did not contain inflation. It means that the high liquidity is not the problem that caused the inflation. Then there must arise the question that, what accounts for the failure of inflation to respond to monetary tightening? The other

[1]For detailed empirical validation of the statement see Okun, 1971; Taylor,1981

question which the study is going to tackle is that, is RBI lacking the real determinants which it should have to target? What is the alternate policy measure to tackle this problem? And the most important question is, is there any compositional shift in inflation determining factors? If there is any compositional shift in inflation determining factors, corresponding to those is there any policy change? Are all factors affecting in the same manner as they were in the earlier period?

Inflation is defined as the sustained increase in price level, eroding the purchasing power of income, increase the cost of living and lowering the real value of savings. And when the process of price rise transforms into acceleration, we need to worry as it imposes many socio- economic costs. It is also the cause of concern for public policy because of the associated costs, especially when a large part of the population has no hedge against inflation. The fundamental reason to pursue long-run price stability is that inflation is economically and socially costly. There is a wide recognition that price stability directly raises the economic well-being by increasing the efficiency of the monetary system and by reducing the uncertainty about the future. There are also macroeconomic benefits of the price stability. Cross-country evidence shows that the countries with lower rates of inflation tend to have higher long-term economic growth rates (Taylor, 1997).

It has been recognised that inflation is a possible outcome of rapid economic development. The factors underlying inflationary process are likely to be specific to the stage of development of an economy. This is because the determinants of the prices are likely to be closely related to this aspect. According to this view, inflation seems to come out of structural impediments. Therefore, what would be the inflation threshold level for the economy to keep the pace of development for long? Some of the studies reveal that the predominance of the cost push factors with a substantial part of cost push originating in international price movements, others hold the view that it is the excess demand pressures on the one hand and the less supply on the other side which fuel the inflation. On the other hand, if the supply of the food items is the factor responsible then the related point of concern is that the record food production, as in 2010-11 did not bring down the agricultural prices. If the problem of supply has been solved, but it doesn't make the change in inflation status in the economy then there may be other factors rather than the ultimate demand and supply that need to be

analysed, these may be administered prices which play a vital role, or it may be the financial inclusion which again leads to the monetarist logic of more money chasing fewer goods and inflation prevails. Is it not the compositional shift of the consumption of food commodities due to an increase of purchasing power of the low-income groups with the implementation of employment and income generating programmes? Or it may not be due to the increasing contribution of the service sector in the GDP that leads to increase in the urban incomes? Or are all the determinants of the inflation affecting the same way as they were affecting earlier, hence is also the main cause of concern. Another point of concern regarding inflation is the role of administered prices which have been considered responsible not only for the current surge of inflation but always whenever India faced especially double-digit inflation since 1956-57. But this research problem has not become the focal point of the researchers and the policy makers yet; there is a need for further research in this context.

Against this backdrop, we can say that government had not examined all the factors behind the inflation and the tools to control it. And another important point to note is that there is no scope for using either monetary or fiscal policy instrument for targeting the inflation, before knowing the factors and their compositional role from time to time responsible for this hocus-pocus situation of inflation in India.

1.1 Review of Literature

A great deal of economic literature concerns the determinants and causes of inflation. Inflation's role in the economy has been at the centre of economic studies and has been debated for a long time. In the recent years, the theories of inflation that have emerged have emphasised the role played by political stability, policy credibility and the reputation of the government and the political cycles in determining or explaining inflation. This emerging literature on inflation has come to be known as a political economy approach to macroeconomic policy. This approach has shifted the attention away from traditional direct causes of inflation, such as money creation,etc. (Wyme, 2008). However, these theories have been criticised as they are only theoretical put exclusive emphasis on industrial countries. However, the dominance of structural and monetary factors is still dominant in determining inflation in developing countries like India. A lot of empirical studies, involving different degrees of sophistication, have been made about inflationary trends and

dynamics of the inflation in the Indian economy. While the database of these studies is largely the same, they differ in certain important respects such as the relative emphasis placed on monetary variables; the period covered the level of aggregation, and the type of methodology adopted. It is instructive to review the existing studies on Indian inflation. This review is not indented to be exhaustive, but an attempt is made to include most of the major studies of the recent vintage. As will be clear from the following account, it is interesting to note that most of the empirical studies were meant to test the explanatory power of the variables suggested by different schools of thought. The different schools of thought have propounded different theories and explanations regarding inflation. The previous studies on inflation in India are based on either of the two most important approaches to modelling inflation: the Monetarist approach is that inflation is fundamentally a monetary phenomenon (i.e. inflation is a result of excess money supply growth over real output growth), the Structuralist approach sees inflation as a result of structural disequilibrium in the economy. In this regard, there are many research results concerning the main determinants of inflation in the world. Our attempt here is to review some of the relevant studies on inflation determination in developing countries and then the studies in the Indian context. To examine their relevance to our present study and also to improve upon their limitations so that the attempt of fulfilling the research gaps will be achieved for the policy implicative purpose.

Among the studies on modelling inflation, the study by Loungani and Swagel (2001) is the one that serves as a starting point for understanding inflation in developing countries. The study employed the vector autoregression to study the experience of the 53 developing nations between 1968 and 1998. The estimated VARs consist of the number of variables such as money growth and exchange rate, output gap, changes in the prices of oil and non-oil commodities, past realisation of inflation. Their findings suggest that either money growth or exchange rate movement, depending on the ordering explain the two third of variance of the inflation at both short run and long run horizons. Their findings suggest that the inflation expectations have the significant role, but the cost shocks and the output gaps are not significant factors affecting the evaluation of these countries.

1.1.1 Empirical Studies on Developing Countries

Chhibber et al. (1989) developed a detailed econometric model of inflation for Zimbabwe. In their model, both structural and monetary factors of inflation were included. In the study, they showed that nominal monetary growth, foreign prices, exchange and interest rates, unit labour costs and real income are the determinants of inflation in Zimbabwe.

Laryea and Sumaila (2001), in their study of the determinants of inflation in Tanzania,established that in the short-run, output and monetary factors are the main determinants of inflation in Tanzania. They also pointed out that in the long-run, parallel exchange rate also influences inflation. In their conclusion, they emphasised that the inflationary situation in Tanzania is basically a monetary phenomenon.

Domac, E.M. Yucel (2005), in their study has investigated the factors associated with the start of 24 inflation episodes in 15 emerging economies between 1980 and 2001. The empirical results of the study suggest that increase in the output gap, agricultural shocks and expansionary fiscal policy raises the probability of inflation and a more democratic environment and an increase in capital flows relative to GDP reduces the probability of inflation. Duma (2008) used VAR model to investigate the external shocks (exchange rate, oil price, and import price shocks) to inflation in Srilanka. The studies come to the conclusion that the low and incomplete pass-through of external shocks to consumer inflation, reflecting a combination of factors including the existence of administered prices, high content of food in the consumption basket, and low per persistence and volatility of the exchange rate.

Arida and Frasicisco (2005) conducted an empirical research, "does political instability lead to higher inflation?" In their study, they combined generalised method of moment's system (GMM) estimation which was applied to dynamic panel data of 100 countries for the period (1960-99). Results of the study showed that a higher degree of political instability (which is measured by using several political and institutional variables) generates higher inflation rates and seigniorage. They also pointed out that the propagative mechanism of political instability in causing higher inflation levels are more pervasive and stronger in developing countries than developed countries which have lower inflation levels.

Seymur (2011) analyses the determinants of inflation rate for the long-run and short-run inflation in 10 CIS transition economies over the period 1996 – 2008 using time series data. Regression technique has been used. Inflation, wages, money supply, exchange rate,are considered as variables. The result shows that increase in the exchange rate and wage growth rate are not only the causes of inflation but monetary policy affects inflation in the short run and vice versa in the long run too.

Heba (2010) analyses the inflation dynamics in Egypt. Co-integration technique has been used. Consumer price index, nominal exchange rate, average annual interest rate, broad money or domestic liquidity, percentage (%) to trade deficit of GDP are considered as variables. The result shows that rate of growth of money supply highly influences inflation in Egypt. The interest rate also influences inflation.

Other than those mentioned above there are many other studies associated with the inflation determination in developing countries, such as Fisher, Sahay and Vegh (2002) on the experience of hyper and high inflation in various countries. The study found that there are a very strong long run and short run relationship between money growth and inflation. Kim (2001) using co-integration and error correction model on Polish economy to explain inflation. Using data for a period of 1990-1999 investigated the impact of monetary, labour and foreign sectors on inflation. The results of the study suggest that the labour and external sectors dominated the determination of polish inflation during the sample period, but their effects have been opposite since 1994. The monetary sector appears not to have exerted influence on inflation, suggesting monetary policy has been passive. Mosayeb *et al.* (2009) applying ARDL approach for investigating sources of inflation in Iran for the period of 1971 to 2006. The results show that in the long run, the main determinants of inflation are the liquidity, exchange rate, the rate of expected inflation and the rate of imported inflation. All these variables had a significant effect on the inflation rate in the short run.

1.1.2 Empirical Studies on India

Among the earlier studies on inflation in India, Pradhan and Subramanian (1998) and Callen and Chabg(1999) follow the Monetarist approach to model inflation in India. Applying co-integration analysis Pradhan and Subramanian

examines the long-run relationship between money supply and prices in India for the period of 1960-61-1993-94. Their results show that none of the price variables (WPI or CPI for different) has any significant long run relationship with the so called something M_1[2]. The WPI and CPI for industrial workers (CPI-IW) have no stable long-run relationship with the so-called broad money supply (M3)[3]. The CPI of the urban non-manual workers (CPI-UNMW) and agricultural labours (CPI-AL) have a significant long run relationship with M3. Hence, they conclude that monetary policy of RBI should target only M3. Findings show that structural factors like agriculture output have a significant influence on both CPI-UNMW and CPI-IW. The study concludes that the inflation process in the India economy is not purely a monetary phenomenon.

Restoring both the monetarist and output gap models, Challen and Chang (1999) explain the behaviour of the overall WPI and manufacturing sub-components of WPI in India through quarterly data during the period 1982 to1998. In their analysis, the price level has been taken as a weighted average price of tradable and non-tradable goods: where the prices of tradable goods are determined in the world market, and the price of non-tradable goods is determined in the domestic money market. The study finds that the growths of the money supply, exchange and import prices are significant predictors of inflation in India. In the out gap model, some lagged output gaps are negative and significant which is contrary to the theoretical prediction. Then they modified the model by including and agricultural and industrial output gap separately and found that in the overall WPI equation the coefficient on the agricultural output gap is significantly negative, and the industrial output gap is positive but not significant . Due to lack of quarterly data on agricultural and industrial output during that period, they used annual data to estimate modified output gap model. Their results suggest that while agriculture output above its potential level due to positive supply shocks reduces overall WPI in India, the industrial output above its potential level is inflationary.

[2] Narrow Money supply includes currency held by the public and demand deposits of the public held by the commercial banks.

[3] Broad money supply refers to the narrow money plus time deposits of the public held by the commercial banks.

Some evidences of causal analysis between money supply and price level in India are described as, using monthly data Bhattacharya and Sharma (1985) find that the direction of causality between money supply and WPUI has undergone a signified change during 1963 to1983, and there is only evidence of only reverse casualty from price to money during the period March 1978 to June 1983[4]. An implication of this result is that money supply has not always been exogenous to the price level in India. So they argue that a simple evidence of the causal effect of money on price is not a significant condition to accept the Monetarists model of inflation for India, which excludes the effect of other non-monetary factors on the price level.

Singh (1989) verified the Monetarists proposition (i.e. change in the price level are primarily the results of the changes in the growth rate of money supply) in Indian content through causality tests based on quarterly data on broad money (M3) and WPI over the period of 1970-71 to 1986-87. He observed bidirectional causality between money and prices and also find that the impact of money supply on prices less significant as compared to the impact of prices on money supply. Hence, he concluded that much of the variation in prices in India might be due to structural factors such as crop failure, commodity shortages and administered pricing rather than because of the money supply.

As the relationship between money supply and price level depends critically on the behaviour of real output, Rangarajan and Arif (1990) constructed a macro-econometric model to examine the interrelationships among money supply, output and prices in India. The model was estimated using data over the period 1961062 to 1984-85. Their empirical results demonstrate that the price effects of an increased in money supply are stronger than output effects.

The empirical literature on inflation in India reviewed so far suggests that the pure Monetarists model cannot be the sole explanation of the inflation behaviour in India. Other factors such as agricultural output, import prices are also important determinants of inflation in India. On the other hand, Structuralist approach considers inflation to be a result of sectoral disequilibrium in the economy. The determinant

[4] The M1 series changed significantly from March 1978due to revised classification of saving deposits into demand and time deposits, so they applied the causality tests suggested by Haugh and Box (1977) for both the periods separately.

mechanism is crucial to the Structuralist approach. It holds that price behaviour is not uniform across the economy; agricultural prices are demand determined. In fact, it is this structure of the economy that implies inflation as a result of continuing excess demand for agricultural output (Balakrishnan 1994). The Structuralist explanation of inflation is that excess demand raises the prices of agricultural products leading to increase in the industrial prices as agriculture products are used as inputs into industrial production.

Balakrishnan (1992) using annual data for a period 1950-80 models the manufacturing sector prices in India through an error-correction model based on the markup pricing rule. Labour and raw material costs are found to be important determinants of prices in the industrial sector. However,Pandit (1993) in its perception of the problem of inflation argued that finance ministry has placed a relatively excessive emphasis on the demand pull factors overlooking the strong cost-push phenomenon that have characterised the economy at that time. The study argued that the issues concerned in the foregoing are not merely a matter of analytical refinement much more of practical importance. The effectiveness of policies to control inflation is inseparably contingent on whether the sources of inflation are correctly perceived. So the implantation of contractionary fiscal and monetary policies is not a good substitute, but there is a need for urgent accountability that must accompany expenditure on different activities, fiscal and monetary contraction resulting from this is desirable. Balakrishnan (1994) finds that the structural model performs better than the monetarist model in explaining inflation in India. Examining the role of sectoral prices in the inflationary process Buragohain (1997) finds that the general inflation in India over the period 1950-93 has been dominated by agricultural prices in general and food prices in particular and concludes that food prices are major determinants of inflation in India as food constitutes the largest share of the family budget.

Some studies focus on the role of the output gap in modelling inflation in India. There has been mixed evidence on the importance of output gap in determining inflation. Chand (1996) studies the behaviour of GDP deflator with an output gap approach over the period 1972-91 and finds that excess demand is an important determinant of inflation in India. Coe and Mc Dermott (1997) find that output gap

model does not work for India. The agriculture sector is subjected to numerous supply shocks. A positive demand shock causes the output to rise above its potential level (i.e. output gap develops), and this leads to an increase in inflationary pressure. However, a positive supply shock due to favourable monsoon is likely to result in the agricultural sector and a decline in general price level through its impact on industrial prices.

The recent literature on the determinants of inflation in India includes Nachane and Lakshmi (2002, Srinivasan *et al.* (2006), Srinivasan et al. (2009), Paul (2009), Dua and Gaur (2009). Nachane and Lakshmi (2002) use P-star model in order to explain the dynamics of inflation in India over the period 1955-1999. Using both annual and quarterly data, it is found that velocity in India is trend stationarity. Using co-integration technique, the paper shows that it is possible to develop a model to gauge inflationary pressures in the economy. The model is well calibrated to data, and in out- of sample forecasts, it significantly performs a seasonal AARMAbenchmark model. The velocity gap version of the model is particularly successful.

With seasonally adjusted monthly data from 1995 to 2005 Srinivasan et al. (2006) estimated an augmented Phillips curve to examine the effects of money supply shock on inflation in India. Their results suggest that supply shock only has a transitory effect on both headline and core[5] measures of inflation. They conclude that supply purse is not crucial in the determination of inflation; it is the policy makers response to these shocks that are important in the process of determination of inflation.

Gali and Gretler (1992) use a hybrid variant of the New Keynesian Phillips curve (NKPC) to explain inflation dynamics in the US over the period 1960:1-1997:4[6] using GMM estimation technique they find that forward-looking behaviour is dominant in explaining inflation in the USA. They use labour income share as a measure of real marginal cost which is a significant determinant of inflation. They also postulate that while lagged inflation is statically significant; it is not

[5] Headline inflation includes the entire set of commodities in the general price index, while as core inflation does not take into consideration commodities that have volatile prices e.g. Food and fuel

[6] The hybrid New Keynesian Phillip's curve relates inflation to real marginal cost, expected future inflation and lagged inflation.

quantitatively important. Therefore, they conclude that the NKPC provides a good first approximation to the dynamics of inflation in the USA. With the use of quarterly data and applying the instrumental variables estimation technique, DUA and Gaur (2009) examine the determinants of inflation in the framework of an open economy forward-looking as well as backward-looking Phillips curve for eight Asian countries. Their study finds that the output gap is statistically significant in explaining inflation in almost all the countries. They also found that import inflation and exchange rates are important determinants of inflation in these economies and for all countries; the forward-looking Phillips curve provides a better fit compared to backward-looking Phillips curve.

In order to explain the behaviour of inflation in India during 1995-2006 Srinivasan et al. (2009) constructed a reduced form model that encompasses various well-known policy mistakes theories and empirically test restrictions imposed by these theories on the inflationary process[7]. Applying the GMM estimation technique they estimate the model using quarterly data and find that their empirical results support these theories regarding inflation in the Indian context. They argue that the initial rise and subsequent fall in the inflation in India over the sample period are due to lack of institutional commitment towards price stability. In the absence of credible commitment to price stability, a series adverse supply shocks during 1960,s to early 1990,s raised the inflationary expectations which in turn transformed into permanently high inflation and low inflation in the later periods is the result of positively supply side development.

Rijo-M-John (2003), in his research paper, used the post liberalisation data on monetary aggregates and nominal effective exchange rates. This study has found that the explanatory power of these variables in explaining these variables is not high anymore. This point to the palatable fact that there could be many other variables that

[7]The policy mistake theories emphasis the role of institutional structure governing monetary policy in inflationary process. These theories include the time inconsistency model, the new inflation bias hypothesis and So called expectation trap hypothesis. The explanation of the time inconsistency model is that the trend growth rate of output is high, equilibrium inflation rate is low and vice versa. The new inflation bias hypothesis demonstrates that when the central bank is expected to engage in stabilisation of output, some uncertainty about the future state of economy and asymmetric concerns about the positive and negative output gaps combine to create an inflation bias. According to expectation trap hypothesis a bad supply shock raises inflationary expectations due to the nature of monetary regime.

could explain the changes in the better way, the interest rate may be one of them; wage rates may be another one. But the study has prioritised only the monetary area with regard to inflation, and the role of the non-monetary sector has been neglected, and the areas which monetary authority should target has not been taken into account in this study.

Pattnaik *et al (*2006) in his paper argued the success price stability in India in mid-90's led to a reduction in inflationary expectations and consequently inflation tolerance has also come down. The study attempted to show that inflation was high during 1970's and onwards because of supply shocks both due to a setback in agriculture production and international oil prices and monetary expansion due to automatic monetization of the fiscal deficit were the major contributory factors to the higher inflation up to the mid-90, s. Due to the reform initiatives in early 90's which led towards the development of broad-based financial markets, improved fiscal monetary and fiscal inferences, improved the supply chain management, the supply of food grains through buffer stocks and import of sensitive commodities during the 2nd half of 90's play a significant role in controlling inflation. It has also been argued that the unprecedented size of capital flows, monetary management was effective in ensuring a reduction in inflation and lowering the inflation expectations.

Patnaik (2010) using the Cointegration Vector Autoregressive (VAR) framework to identify the determinants of inflation in India. The study used Consumer Price Index (CPI), as a price index, Index of Industrial Production (IIP) as the volume of demand in the economy, Reserve Money (RM) as money supply and Import Index (IMP) measuring as an external influence on domestic prices as variables for the period 1991-Q1 to 2008-Q2. The study came to the conclusion that the Indian inflation is major demand pull inflation, however, the supply side factors influence in the short run. As a result stabilisation policies should be proactive by focusing on demand side management policies on a long-term basis and supply management policies keeping in view their short-term impact on inflation.

Pratima Singh (2011), in her paper, analysed the trends in inflation over past five years, particularly food inflation and examined the demand and supply side factors behind surging food prices. It argues that demand for several food items in India exceeds their current supply and leads to high prices. It further contends that this

demand and supply imbalance is attributed to structural inefficiencies including the distribution of food products. The paper has emphasised the importance of increasing the agriculture productivity and reforming retail trade policies. The other alternative is the provision of direct cash transfer to the farmers in spite of subsidies. But the question arises again that due to the provision of direct cash transfer the purchasing power of the low-income class may rise and leads to increase in demand for food articles hence again the problem of what is known as food inflation will sprout.

Rakshit (2011) argued that the sources of inflation during the period 2006-2010 were not excess demand but rather a sector specific. Cost push factors such as fuel prices which determine wholesale price index (WPI) inflation or adverse supply shocks in agricultural output which determines the consumer price index (CPI). Accordingly, he argued that the RBI should identify sources of inflation through a careful security of sector specific movements in prices and to study the transmission mechanism of supply shocks to general price inflation. Hatckar *et al.*(2011*)* empirically presented a different view on inflation with an emphasis on international prices. The study has empirically verified that the rise in global commodity price is a major threat to domestic prices and output. Using monthly data for the period 1994:44 to 2010:12 found that the restrictive monetary policy attempting to cool the overheating economy might be only limited relevance in controlling non-food inflation and might take a serious toll on growth. As it has been empirically shown that overheating which has recently acquired policy focus, drives inflation in the short run whereas international material and energy prices drive over the short run as well as in the long run.

Bose (2012) in his paper attempted to focus on the sources of inflation and policy options to control it and emphasised on the policy shift from its traditional one. The paper argued that despite the fact that range of monetarist is within micro-behavioural and cost push explanation to the general inflation, the general consensus is that monetary policy tightening has failed in its desired impact on inflation. He argued that the shift in the policy focus to address issues in agricultural production along with the issues in the distribution and pricing of strategic commodities like food and fuel seems to be reasonable policy path that might enable moderation of the inflation in the medium if not in the short run.

From the review above, it is apparent that there are a number of empirical studies to explain inflation developing countries in general and India in particular. The differences among the economists in explaining this phenomenon are clearly displayed, but in general, these empirical studies can be mainly divided on the basis of theoretical background as discussed in the theoretical review of some important theories. These empirical studies can be divided into two main categories: the Structuralist and the monetarist, despite some emphasis on the Keynesian approach of demand effect. Studies supporting the Structuralists view have tried to prove that increase in prices can be sustained without an increase in money stock due to the ability of the private sectors to create credit within each sector to finance the increased price level and the existing bottlenecks in the economy are also responsible for the same. In contrast, those supporting the monetarist's view, try proving the role of money supply in price rise empirically and arguing that the stability of private sectors demand for money results in the inflation when the money stock is increasing. As a result, inflation only occurs when money stock is increased. While some studies argued and had empirically tested that it is the presence of output gap which is responsible for this zigzag type of inflation in the economy.

The studies reviewed focused on wide range of determinants of inflation in India under different theoretical frameworks. But as far as the studies on inflation in India are concerned they have made an attempt to argue either the inflationary process is a demand or supply driven, or other way they are making an attempt to support or reject the different schools of thought regarding the compositional aspect of inflationary process But as we know, a big thanks goes to a series of reform measures since 1991, the period which witnessed major institutional and structural changes in the Indian economy compared with the pre-reform period. The economy is now much more market oriented, government control over production, investment, trade and other economic activities is significantly less, and integration of domestic and inert national economy is much greater. In the process of factors driving the macro behaviour of the economy and problems facing the policy makers have undergone major changes. In this scenario, the compositional aspect of the inflation is not an exceptional case. But what is more unfortunate is that as per of knowledge is concerned none of the studies analysed the changing nature of the inflation determinants. As is evident from the majority of the studies the major factors

responsible for the inflation are money supply, food prices, import prices, etc. not only in the post-reform period but from early 1950,s. If these are really the culprits behind the cruel inflation time and again, so tight, monetary policy should have made the price stability in the economy. In the same way, the abundance of food production in the economy should have lowered the food prices the same way. But the results are somehow different as we have seen in the economy especially from last few years. We can say the policy makers are facing a trap of policy failure rather policy paralysis with respect to capturing inflation within a reasonable range despite the continuous changes in policy instruments proposed for controlling inflation. It has also been argued that the post-reform period had successfully led to price stabilisation in mid-90's due to improved supply chain management, broad-based monetary and fiscal market, etc. have played a major role in mid-90's to control inflation, but the question arises why not in post-2005 same helps to control inflation? Is it that the compositional pattern of inflation has changed or is it policy failures that lead to these unpredictable higher inflation rates? So there is a need to study the nature of a compositional aspect of the inflationary process in the pot reform period. Another important issue related to those studies is that a few studies have been done to study the inflationary process of the post-reform period in Indian economy. There is a need for using more recent datasets were from the policy failure is more evident, with those where there was the quick response of the policy changes (as was evident in the early post-reform period).

1.2 Need for the study

The main purpose of this study is to examine the changing nature of major determinants of inflation in India. It also seems that if the major factors contributing the inflation are somehow same but, there is a shift in the compositional pattern of those determinants, and so there is need to understand this compositional shift. Based on this, it will be possible to know whether the inflation is monetary or real sector issue. This will help in determining (adopting) the best policy package that government can adapt, so that the targeting, controlling and achieving the price stability becomes easier. Inflation is considered to be a major economic problem in developing economies such as India. Thus, fighting against inflation and maintaining stable prices have become the main objective of the monetary authority. In the post-

reform period, the inflation rate has played the hide and seek game scaled from a very low to a high level and crossed the unexpectedly acceptable levels and finally became out of control, especially in the last few years. Therefore, there is a need to take appropriate steps to maintain it within limits. Any prescription without a careful investigation of its causes might not be appropriate. A plentiful policy instruments have been used by monetary authorities to tackle this issue, but all in vain and academicians and researchers have done a lot of studies to provide a solution, but the above-cited studies either have the variable bias or have not selected the proper time period to analyse the inflation process very well. The studies above cited seem to indicate that there is a need to develop a model to explain inflation in India, which could provide the solution to this long living problem. So there is the need to study the changing nature of determinants of inflation and also their compositional shift in determining the inflation in India. With this, the study is going to analyse the inflation process in the whole post-reform period, and most ravishing part is that this kind of study is the first initiative done till date. So against the backdrop, the study will be conducted with the following objectives;

1.3 Objectives of the Study

- To examine the changing nature of major factors responsible for inflation in the post-reform period.
- To examine the pattern of a compositional shift in inflation determining factors.
- To study the causes of the ineffectiveness of monetary policy in controlling recent surge of inflation.

1.4 Hypotheses of the Study

The following hypotheses have been formulated as the basis for the study.

- There is a significant change in the nature of inflation determining factors in the post-reform period.
- There is a significant shift in the compositional pattern of inflation determining factors.

- There is policy ineffectiveness in terms of combating inflation, due to non-inclusion of changing nature and a compositional shift in inflation determining factors.

1.5 Methodology

The whole study is based on the secondary data and the time period of the study is from 1991 to 2013. In the study, we have used various statistical and econometric techniques to estimate the results. However, the detailed methodological pedagogy has been explained in the respective chapters. However, some general overview is important here. As the study is based on secondary time series data we have to make use of Augmented Dickey-Fuller (ADF) test (1979) for checking the non-stationarity of the data. After that for checking the causality and the other relational aspects we have used the Autoregressive Distributive Lag models and Toda and Yama (1995) method of Granger causality also. Not only this but for checking the stability aspect we have made use of Change-Point Analyzer. We also have done some indexing in the form of input cost index[8], monetary condition index and monetary policy index[9]. The variables used in the study are inflation, food inflation, exchange rate, money supply (M3), oil prices, interest rates and the policy rates, input cost index, call money rates, etc.

Sources of Data: The whole study is based on secondary data. The main sources of data have been collected from various sources.

International Sources: World Bank Reports, IMF, etc.

National Sources; RBI bulletins, Ministry of Labour Bureau Reports, Ministry of Commerce and Industry, National Sample Survey Organisation, etc.

Other Secondary Sources; Books, Journals, Periodicals, available literature, the data source sites like www.indiastata.com, www.wicts.org, etc.

The study will simply tools like multiple regression models, autoregressive models, percentages ratio, bar grammes, and pie charts wherever required to analyse

[8]For the detail of this refer to the chapter 3 of the thesis.
[9]For details refer to the chapter 6 of the thesis.

and interpret the data. All the analysis will be done by the statistical software Stata10 and Ms excel.

1.6 Outline of the Thesis

The chapter two 'inflation; A Theoretical Framework' begins with the basic problem i.e. the definitional aspect of the inflation; however, till date no firm and universally acceptable definition of the inflation exists. Then, the chapter moves on and tries to throw some light on the measuremental aspect and accordingly the compositional changes, with respect to the factors that are taken into account while measuring the inflation. We also find out the problems associated with these measuremental tools and also suggested some measures for correcting them. The final section of the chapter deals with the development of different theories; that are explaining the determinantal scenario of inflation ranging from classical school of thought to most recent one that is the new political macroeconomics of inflation. The section describes how the different schools of thought have different viewpoints with respect to the determinants of inflation.

The chapter third 'Food Price and Inflation Dynamics in India' tries to understand and estimate nature and compositional aspects of food inflation in the sample period. It has been found that there has been a dramatic change in nature and a visible shift in the compositional pattern of food inflation. The chapter also examined the determinants of food inflation. The main purpose was to cross check that,are the policy instruments and the targeted variables moving in the same way. In other words, are the policy makers hitting the variables they are supposed to hit given the changing dynamics of food inflation? It was found that there is a mismatch between the variables that policymakers are supposed to target and they are actually targeting. The chapter concludes with some concluding remarks suggestive measures.

The chapter four, 'Oil Prices and Indian Inflation' tries to examine the dynamics of oil prices. The main concern of the chapter is to understand the nature and compositional pattern of the oil prices in the sample period. The chapter makes the detailed analysis of pricing mechanism of the petroleum products and how it has changed from time to time with the changing dynamics of the economy. Then we moved on to the compositional scenario of petroleum products both from the trade

point of view and from the fiscal point of view. The results were somehow contradictory of what the government is always arguing and hence defends his policies either the decontrolling or the de-subsidising. The chapter also throws some light on the implication part of how petroleum product prices have an impact on the general prices. The chapter concludes with a million dollar question, that there is a need for cost-benefit analysis either to go de-subsidisation or decontrolling but not the both for an economy where 80% of the demand is fulfilled via imports.

The fifth chapter 'Money Supply Dynamics' introduces the linkage between money supply and inflation and it seems that Indian economy is one way or another way following a classical trend. Then the other section of the chapter deals with the determinants of money supply and the nature and pattern of the determinants have also been taken into account. Following the 'money multiplier' approach it has been found that there is the dominance of 'high powered money' in the economy although well-established fact. Then we proceed and try to understand the nature and pattern of determinants of both 'H' and 'm' and the ultimate factors determining the both. The interesting result of the exercise is that the role of factors such as foreign exchange reserves determining 'H' is dramatically increasing, in fact, a positive sign of the growing economy. However what taunting is foreign exchange reserves are dominated by a dollar. This dominance of dollar may have a danger that it may lead to 'dollar colonisation'.

The sixth chapter 'Effectiveness of Monetary Policy' tries to understand the link between the policy instruments and inflation. The main concern is to examine, with the changing dynamics of inflation determinants and so the inflation is there any change in the policy instruments. If yes, then why there is a problem of inflation and if no, then what is the outcome? The same analysis is done with the help of monetary condition index and monetary policy index.

The study ends with a conclusion, which gives an outline of major findings of the study. Further, it makes some specific suggestions, and it is hoped that it may open a new window of research for further investigation of the problem.

CHAPTER 2

Inflation: A Conceptual and Theoretical Framework

Inflation: A Conceptual and Theoretical framework

The phenomenon of inflation has become the front page news in almost all countries of the world whether they may be developed or developing countries. The later are relatively greater sufferers on account of it because of the vast extent of poverty, low employment, lack of adequate resource especially foreign exchange reserves, etc. It has become very difficult to pull the economy out of this problem. Today not only the economists but also the politicians and other social scientists are taking a keen interest. It is because of the fact that they are afraid of its serious repercussions on the distribution of income and wealth among different social classes and individuals on the rate of economic growth of a country and on the stability of given political and economic system, so its study is not only significant but also highly rewarding.

The literature on inflation is vast and growing (see D. Laider and M. Parkin, 1975 and H. Frisch. 1983, M. Bronfenbrenner and F.D. Hoolzman, 1963) during last two decades or so, many separate issues had been interwoven in the literature of inflation which might arise out of particular semantical usage of the terms "Monetarism"[1], "Keynesianism" [2] and Structuralism".[3] The relevance of monetarism v. Keynesianism under the conditions of industrially advanced countries has been extensively discussed particularly in respect of heavy unemployment, a rapid rate rise of money prices and cost of living in these countries. While the problem of inflation in relation to economic development in the context of developing economies has given birth to a number of the complex series set of controversies which has led to the emergence of two major schools of thought, so-called monetarists and structuralist.

[1] The Monetarist school is associated with the name of Milton Friedman and his followers like Karl Brunner, Allan Meltzer, Phillip Cagan, Don Patikin, J. Jordan, L. Anderson, Anna Schwartz and K, Carlson. They are Morden advocates of neo-classical economics.

[2] Keynesians are those who follow the Income-Expenditure theory and places chief reliance on the government's taxation and spending power to stabilize the economy. The prominent Keynesians are James Tobin, P. Samuelson, Sir John hicks, Nicholas Kaldor, G. Ackely, A. Okun, W. Smith, W. Heller etc

[3] Structuralist approach to inflation derived its inspiration from the economic events in the Latin American countries, particularly those which record high rates of inflation along with some rate of economic growth. Structuralist hold that even in the absence of excess demand, inflation may result from specific rigidities in the economy. The Structuralist group represents, among others, D. Seers, Rual Prebisch, O. Snuker, J.H.G. Olivera, G Maynard, R. Vogel, victor Orgy, and Corbo Lioi.

Besides this, a new macro frame which is known as" Supply-side Economics" had also been gaining policy attention in contrast to the "Demand-side Economics". In essence, as against the conception of 'Demand-side Economics' supply follows on the heels of demand, the supply-side economics projects the view that if supply side is taken care of, the demand side will care of itself. This is so because the commodities buy commodities. Thus the debate of controversy between these schools of thought centred around (i) the nature and causes of inflation; (ii) the usefulness and effectiveness of monetary and fiscal policies to curb it; and (iii) the compatibility inflation with economic development. In this background, an attempt is made in this chapter to present a brief theoretical survey of the literature on inflation in connection with some conceptual and measurement issues, and different theories. Such theoretical analysis, needless to say, is extremely important to develop a framework which permits a study of inflation determinants and their compositional pattern with particular reference to Indian economy during the post-reform period.

The chapter as begins with the introduction has been further divided into three main sections. The section 2nd deals with the basic problem i.e. definitional aspect of the inflation, if however there is still till date no universally accepted definition of inflation, along with a brief description of the types of inflation depending upon the speed, process, mechanism, etc. The section 3rd of the chapter deals with the important issue of the inflation i.e. the measurement aspect of the inflation. The section describes the different types of prices indices along with their critical analysis and also the majors for reforms. The section 4th of the chapter deals with the development of different theories in general of inflation from the earlier classical up to the Structuralist approach, and an attempt is made to link these theories with the present study in the Indian context. Finally, the last section i.e. Section 5th ends up with a brief framework of the study based on the theories related to the same.

2.1 Nature and Definition

The problems associated with inflation do not begin with the explanation of it, however with the attempt to define it. In fact, there is no generally acceptable or satisfactory definition. The term inflation is most conveniently associated with a substantial and persistent rise in the general price level or what is virtually the same thing a continuously falling value of the monetary unit or a rate of expansion of

money income greater than the rate of growth of real output. M. Bronfenbrenner and F.D Holzman distinguish four types of definitions of inflation: (i) Inflation is a condition of generalised excess demand, in which "too much money chases too few goods." (ii). Inflation is a rise in money stock or money income, either total or per capita. Both these definitions actually appear causal in nature as in first; it is due to excess demand in goods market and the second is, as a result of a change of money supply. (iii). Inflation is a rise in price levels with additional characteristics or conditions: it is incompletely anticipated; it leads (via cost increases) to further rises; it does not increase employment and real output; it is faster than some "safe" rate; it arises "from the side of money"; it is measured by prices net of indirect taxes and subsidies, and/or it is irreversible. (iv). Inflation is a fall in the external value of money as measured by foreign exchange rates, by the price of gold, or indicated by an excess demand for gold or foreign exchange at official rates. (Bronfenbrenner and Holzman, 1963, p.593). Although a rise in the general level of prices is a basic characteristic of inflation, it does not always reflect a state of inflation. Because prices in the dynamic economy may rise on account of many factors. In a state of suppressed inflation, surging trend of rising prices of different basic consumer's goods are kept down or stable by an efficient system of artificial control and rationing so that prices remain visibly stable in the market, but the moment these controls and rationing are relaxed or removed, the process of continuously rising prices begins. Despite this, prices may also rise for a temporary phase on account of the failure of agricultural production in a particular year. As a result, of which prices of other consumer goods may remain steady. In both the cases, there is a general tendency of price to rise, though the tendency for the rise in prices in the first instance is self-expansionary and cumulative, if controlled are relaxed or removed, and in the second instance, either the rise in the price is self-limiting or it does not represent policy implication. Thus, the price becomes inflationary only when every rise in the price level becomes the base for a further rise in the price level, and the process becomes not only self –sustaining but also self-accelerating (V.K. R. V. Rao, et al., 1973, p-6.)

Inflation, therefore, is a state of imbalance between the marketed stock of basic goods or basic commodities and the active stock of money. Until the point when money prices of basic commodities have reached their settled levels, the state of inflation will continue to exist. So long as there is disequilibrium caused in a pre-

equilibrium situation either by variations in market availability and/ or supplies in the basic goods and/ or by variation in the stock of active money inflation prevails. Moreover, a true definition of inflation should also reflect the elements of social disparities in economic life so that the degree and extent of economic injury to the different segments of society can be judged in the light of not only economic but also of social justice and in the background of persistent inflation (Brahmananada, P.R. and Vakil, C.N, 1979, p-15).

A real understanding regarding the definition of inflation probably requires a more profound insight into the dynamic process of price formation at the microeconomic level and identification of mechanisms of price increase in the various economic structures so that the major inflationary forces may be located. Such a definition should not only take into account the factors responsible for the rise in the prices but also show how these factors originate within the economic system and are fostered by the interaction of economic forces. So despite having different views on the definition of inflation by the different economists, but the most frequent term inflation is associated with a substantial and persistent rise in the general price level or what is virtually the same thing a continuously falling value of monetary unit or a rate of expansion of money income greater than the rate of growth of output.

2.2 Types of Inflation

Inflation is of different types. These types may be looked at by dividing them into different categories on different considerations. In the first place, we may distinguish between different categories of inflation on the basis of degree or speed with which the prices rise. Secondly, the distinction may be based on the processes through which inflation is induced. Thirdly, different types of inflation may be on the basis of working with the market mechanism. Fourthly, inflation may be categorised on the basis of expectation. Fifthly inflation may be classified on the basis of causes.

On the basis of the rapidity with which prices increase, inflation may be divided into creeping, moderate, galloping and hyperinflation. Inflationary process in which the increase in price does not exceed 2-3 percent and in which there are no expectations of inflation to speak may be characterised as “creeping” inflation. In fact, it is considered as an instrument of economic development. Higher rates of price

increase are labelled "moderate"; a further acceleration of the increase in prices the epithet "galloping." However, one cannot set exact boundaries between any two of these categories. Extraordinarily high rates of price increases, which in general are also accelerating, can be called "hyperinflation." P. Cagan (1956, p.25) defines this as a condition in which the general price level is increasing at a rate of more than 50 percent per month. In hyperinflations, money loses its function as a store of value and at least partly as a medium of exchange. (Frisch, 1983, p-12).

On the basis of different processes through which it is induced, inflation is of three types: (i) Deficit-induced inflation, which is caused by the adoption of deficit financing or by government spending in excess of its revenue receipts. (ii) Wage-induced inflation, which results from the increase in money wages. (iii) Profit-induced inflation, which occurs on account of an increase in the profit of manufacturers. Another type of inflation may be export-boom inflation, i.e. as with the considerable increase in exports may cause a shortage at home (with exporting country) and result in price rise on the other hand if a country imports goods from foreign countries and the prices of those goods increase abroad this would lead to increase in price level in the importing country also, this is known as import-price hike inflation. As in India, increase in oil prices in OPEC lead to an increase in the price level also in India.

On the basis of market mechanism inflation may be open or suppressed. If inflation is open, the market economy basically continues to function as a process in which prices are set. Any excess demand (the goods or factor gap) leads to an increase in prices and money wages, and the government does not attempt to restrict inflation. Suppressed inflation occurs when the government controls prevent goods, prices and money wages from rising so that excess demand is not reduced but suppressed. If controls are lifted, one must reckon with an increase in the general price level and in money wages (Hansen, 1951, p-3). In this type of inflation, the government intervention of suppressing price may give rise to corruption, black marketing, hoarding which may further act fuel for escalating inflation. The expectation criteria used to classify the inflation differentiates between anticipated and unanticipated inflation. The classification is relevant in determining the effects of inflation. Only unanticipated inflation produces real effects; that is, only unanticipated inflation affects output and employment. Another type may be on the basis of measurement

index used for measuring inflation as is evident in India. In this case, there are mainly two types of inflations i.e. based on wholesale prices and on the basis of consumer prices measured by the WPI and CPI indices respectively.

One more type of inflation exists either, the headline inflation i.e. (WPI inflation in India) which is a measure of total inflation within the economy[4] or core inflation i.e. inflation based on the basis of exclusion of certain items that face volatile price movements. In India, it has become very much common from last few years due to increasing inflation pressures to exclude the food and oil prices which are very much volatile. The differentiation between the Demand-pull and Cost-push inflation hinges on the cause of inflation. The former is considered to result from excess aggregate demand; the later from a shift in aggregate supply function.

2.3 Measurements of Inflation

Inflation is the rate of change of price level. For measuring the general price level index[5] numbers are constructed by taking a weighted average of prices of individual goods and services. The weight assigned to each good or service reflects the relative importance of that good or service in the economy or the consumption basket of the consumers and producers. The general price index so constructed indicates the overall magnitude of prices of goods and services. Measurement of the inflation for the conduct of the monetary policy in particular and the other policies, in general, has been a challenge in almost every country. As one of the chief problems in the (measurement) study of inflation is the choice of particular type of index in terms of which the variations in the general price levels are measured. As the prices of different goods and services in the different sectors of the economy move neither in the same direction nor to the same extent, it is necessary to arrive at an average price movement by constructing a general price index over a period of time for the conduct of smooth policy initiative. The economic literature on price indices is concerned with

[4] However in India it does not present an accurate picture of the current state of the economy as it doesn't take account of one of the major GDP contributing sector i.e. service sector. In the backdrop of major problems associated with the measurement of inflation Reserve Bank of India (RBI) identified that, which inflation index do we target? Our headline inflation index is the WPIO and that does not, by definition, reflect the consumer price situation (Subbarao 2010)

[5] A price index is a measure of the proportionate or percentage changes in a set of prices overtime (ILO.2004 "Consumer Price Index manual: Theory and Price" International Labour Organisation Geneva).

three basic questions viz, what set of prices should be covered in the index, what is the most appropriate way in which to average their movements and how accurately any given price captures the movements in general price level. Against this backdrop in India there are three major price indices published: the wholesale price index (WPI), the consumer price index (CPI) which is calculated for three different types of workers for those in industrial sector (CPI-IW), for agriculture labour (AL), for rural labours (RL) and for urban non-manual employees (UNME) and the third index is the GDP deflator. The WPI is available weekly with a lag of two weeks for the provisional index and ten week lag for the final index. The CPI is available monthly, with a lag of one month and the GDP deflator is available for the economy as a whole and its different sectors, on its quarterly basis.

The two most popular price indices that are used for measuring the change in the price level are the Passache Index and the Laspeyre's Index.

The Laspeyres is calculated by using the following formula:

$$\mathbf{P_L = \sum (P_{tn}.Q_{tn})/ \sum (P_{to}.Q_{to})}$$

The Passache index is calculated using the following formula:

$$\mathbf{P_P = \sum (P_{tn}.Q_{tn})/ \sum (P_{to}.Q_{tn})}$$

The P in the formula refers the price level, Q the quantity of a commodity, t_o and t_n refers to the base and current periods respectively. However, the Laspeyres Index L_p shows the relative change in the cost of a basket of goods originally purchased in a base period. Although this index is most often used in statistics, it has a significant weakness- namely that the base period bundle of goods is held constant. If the relative prices of goods change during the period of inflation, then the firms and households will demand smaller quantities of goods that have become relatively less expensive. The effect of this demand shift is suppressed in the Laspeyres Index. It accords too much weight to goods that have relatively more expensive and little to goods that have become relatively less expensive. In relation to the actual change in prices, therefore, the Laspreyer's Index overestimates the rise in the general price level. Finally, the Laspeyres Index does not take into account new goods that

appeared in the market for the first time after base period. Correspondingly, the index contains goods that have become obsolete in the current period.

On the other hand, the Paasche Index takes into account the basket of goods purchased in the end period as a point of reference. In contrast to the Laspeyres Index, it takes into account changes in the pattern of demand. This correctly captures the structure of expenditures in the end period, but it can be shown that Paasche Index overestimates the total expenditure in the base period so that it generally underestimates the rise in the general price level.

2.3.1 Wholesale Price Index (WPI)

The WPI is the most widely used inflation indicator in India. India is one of the few countries where WPI is considered as the headline inflation measure by the central bank. This is published by the Office of Economic Advisor, Ministry of Commerce and Industry. India is one of the few countries where the WPI is considered as the headline inflation. The preference over the CPI is often explained in terms of three criterion: national coverage, timeliness of release and its availability in its much-disaggregated format (Mohanty 2010). It is in use since 1939 and is being published in 1947. Since 1939, the base year of the WPI has been replaced a number of occasions based on the structural and dynamic changes in the economy. The current series is based on the base year 2004-05, has been launched on 14th September 2010. The Working Group for Revision of Whole Sale Price Index Numbers OEA DIPP (2008) discussed the construction of this (base year) new weighting scheme. The report pointed the inherent difficulty of defining the concept of the universe of the WPI. While in principle, the WPI should comprise all transactions at the first point of bulk sale in the domestic market, in practice, how to account for these transactions and what sources are to be used, are issues that remain open to interpretation. Furthermore, the weighting could be based on the notion of value added, final demand or gross output. The approach underlying the WPI relies on two concepts: the gross value of output for manufactured and value of marketed surplus for agricultural products (II.Patnaik.2011).

Representative commodity basket comprising 676 items has been selected and weighting diagram has been derived from the new series (base 2004-05 against

435 items with base 1994-95) consistent within the structure of the economy. The number of quotations selected for collecting price data for the above items is 5482 (against 1918 quotations for the base 1994-95). A comparative statement of weighting, number of items and the number of quotations between the old and the new series of the major groups is in the table below.

Table 2.1: Comparative statement of Weights and Quotations Assigned under Old and New series

Major Group	Weight		No. of Items		No. of Quotations	
	2004-05	**1993-94**	**2004-05**	**1993-94**	**2004-05**	**1993-94**
All commodities	100	100	676	435	5482	1918
Primary Articles	20.12	22.02	102	98	579	455
Fuel & Power	14.91	14.23	19	19	72	72
Manufactured Products	64.97	63.75	555	318	4831	1391

The WPI construction begins with the calculation of relative prices (P_1/P_0x 100) for each price quote of the commodity. For obtaining commodity/item level index, a simple arithmetic average of the price relatives of all the verities (each quote) is taken. Next aggregation method based on Lasperyre's formula, is used to arrive at indices for the subgroups/groups/major groups of WPI. The aggregation method formula is as follows:

$$\mathbf{I = \sum (Ii \times Wi) / \sum Wi}$$

Where

$\sum$ represents the summation of operation.

I= index number of the Wholesale price of a sub-group/group/major group/all commodities.

Wi= The weight assigned to the ith item/sub-group/group/major group.

Ii=Index of the ith item/sub-group/group/major group.

Price relatives are calculated as the Percentage ratios, which the current prices bear to those prevailing in the base period .i.e., by dividing the current price by the base period price and multiplying the quotient by 100. The commodity index is arrived at as the simple arithmetic average of the price relatives of all varieties included under that commodity. The indices for the sub-groups/ sub-group/group/major group/all commodities are in turn worked out as the weighted arithmetic mean of the indices of the items/ sub-group/group/major groups falling under their respective heads.

Although WPI is mostly widely used inflation measuring index in India, however, it has a lot of loopholes both from methodological as well as theoretical point of view. The major criticism of this index is that, as it represents the wholesale price level, the general public does not buy at the wholesale level. Thus WPI does not give the actual feeling of the amount of pressure borne by the general public. Another problem in association with these price indices (WPI in particular) is concerned with inadequate accounting for new products and quality change in the existing products. Most of the bias (0.60 percent)[6] because of this quality and new product and is more relevant in the post-reform period due to many structural changes and diversified growth trends in the economy. One of the, if not the most important, consequences of reforms is that competition has vastly increased which leads to the improvement as well as the quantity of the wide range of products, with this competition, led to a reduction in their costs. So it is likely that our indices (WPI and CPI's), which do not reflect these changes, considerably overstate the underlying inflation since the reforms. There are procedures that are in place in the US for taking into account introduction of new products and for the quality change in the existing products. Unfortunately, we do not seem to have any such systematic procedures.

The WPI is compiled on a weekly basis based on the price quotations collected by the office and non-official agencies on 676 selected items identified in the basket of the index. The NSC (2001) had this to say about the prices that go into the index: "Owning to the wide variety of sources, centres and specifications and due

[6] According to Boskin Report that in the US the inflation is upwardly biased on account of the quality changes in the products. Social Security Administration (1996). "Towards a more accurate measure of cost of living, final Report to the Senate finance Committee from the Advisory Commission to Study the Consumer price Index (http://www.socialsecurity.gov/hostory/report/boskinrpt.html)

to the practical compulsion of collecting data by voluntary methods, it is difficult to maintain uniformity in the concept of wholesale price in the collection of price data. In many cases, these prices correspond to the farm gate, factory gate or mine-head prices; and in many cases, they refer to prices at, at the level of the primary market, secondary market or other wholesale or retail markets. Thus, the WPI as presently compiled does not reflect either the producer or the market price in a consistent manner."

The price indices are based on a fixed weight and do not take into account the impact of product substitution within the production/consumption basket. Consumers may substitute some products whose relative prices have increased over time with some other goods whose relative prices have fallen, in order maintain utility. Therefore, fixed weight based price indices tend to either overestimate or underestimate the true cost of living.

2.3.2 Consumer Price Index (CPI)

The overall CPI is meant to represent the cost of a representative basket of goods and services consumed by an average household. The CPI measures the price changes from the perspective of the retail buyer. It is the retail index of the common people. It reflects the actual inflation borne by the individual. However, in India, the existing CPI refers to the specific segments of the population. These relate to four different segments of workers viz- industrial workers (IW), agricultural labourers (AL), rural labourers (RL) and the urban non-manual employees (UNME).

NSC (2001) noted that the different CPI's are meant to be relevant to different segments of the population. CPI-UNME (the base year 1984-85) is meant for those who derive 50% or more of their income from gainful employment on non-manual work in the urban non-agricultural sector. The weighting diagram for the index with base 1986-87 was derived from family living survey condition conducted during 1982-83 in 59 selected urban centres with centres being allocated to the states in proportion to their 1981 urban population.

CPI-RL (base year 1986-87) is for the households deriving their major income in the previous year from the wage paid manual employment in rural areas. For

among rural labour households those deriving 50% or more income in the previous year from wage paid manual labour in agriculture are defined to the agriculture labour (AL) (the base year 1986-87) household for whom the CPI-AL is intended. Thus, then wage salary paid non-manual employees and self-employed in rural areas are excluded from those indices.

CPI-IW (the base year 2001) is for industrial workers employed in any one of seven sectors: factories, mines, plantations, railways, public motor transport undertakings, all electricity generators and distribution as well as ports and docks. The weighting diagram for the index with the base 2001 was derived from a working class family income and expenditure survey (FIES) in 78 selected centres in 1999-2000.

CPI, if however, represents the price changes from retailer buyers, but it also comes across a lot of criticism. As per intends of coverage is concerned, there is no simple way of estimating the share of population for which the indices should be meant. Due to this, a large chunk of the population is excluded from the ambit of price indices. Another issue associated with these indices is the outdated references periods, and more horrible is that some periods are even before of reform which ultimately understates the inflation index in the country. Also, the data is collected from some markets and shops (centres), but it is unclear how one would define what should constitute the universe of wholesale or retail prices from which a "representative" set is to be chosen for use in compiling price indices. Although some rule of thumb is specified for the replacement of outdated/unavailable centres as well as shops and commodity specification, in practice there is a considerable lag in replacement.

It is important to mention that the CSSO released the new CPI with the base year 2010(Jan-Dec=100) on 18th February 2011, with some features as compared the earlier ones. Some important features are the disaggregation of CPI on the basis of rural and urban level in contrast with the earlier CPIs that represented the specific class of the population. In addition to better geographical coverage as well as commodity coverage, the weights have been derived from the 61^{Ist} round of NSSO consumer expenditure survey (2004-05). The data collection from 310 urban centres and 1181 villages as compared to 78 centres in earlier CPIs have been selected broadly on the pattern of population distribution. The basket of consumer goods in

the new CPI has also risen from 25 to 250. However, the basic flaws that lead us not to use this index in the study are that the data will be available from 2012 and hence will not be feasible for empirical analysis.

2.3.3 GDP Deflator

The GDP deflator is another index used to measure inflation which is often considered to be broader than CPI and WPI. It is measured as the ratio of GDP at current prices to the GDP at the constant prices. Following this procedure, the GDP deflator is legitimately recognised as a high-quality measure of inflation as it includes all transactions within the economy. The information on GDP deflator, however, available with a time lag of more than two months, makes it less useful for the (monetary) policy purposes.

In India, some observers have argued in favour of using GDP deflator as the reference measure of inflation. While appealing in theory, these suggestions do not take into account the actual procedures used to estimate this deflator in India. For quarterly accounts, the production approach of GDP estimates is first obtained as using proxy indicators of quantity (e.g., Industrial production) and then inflated to current price estimates. This operation especially for the most recent quarters using overall WPI series and not the only one commodity or like only one area, i.e., is industrial production. It should not, therefore, come as a surprise that the dynamics in deflator closely resemble the one of the WPI especially as in the last available quarters as mentioned in Nadhanael and Patnaik (2010). Thus, by construction, the most recent figures on the quarterly GDP deflator contain little information beyond that already visible in the WPI and CPI. The following table will summarise the price indices used to measure the inflation in India.

Table 2.2: Price Indices used to Measure Inflation in India

Features	CPI(IW)	CPI(AL)	CPI(RL)	Combined CPI (Rural + Urban)	WPI
Food Weights in %	57	69.1	66.7	49.7	14.3
Data Complied and Released by	Labour Bureau Ministry of Labour	Labour Bureau Ministry of Labour	Labour Bureau Ministry of Labour	Central Statistical Office (CSO) Ministry of Statistics and Programme Implementation	Office of Economic Advisor (OEA), Ministry of Commerce
Source of Weights	Family Living Survey, NSSO, 1999-2000	Consumer Expenditure Survey, NSSO 38rd Round. (1993)	Consumer Expenditure Survey, NSSO 38rd Round. (1993)	Consumer Expenditure Survey, NSSO 61st Round (2004-06)	As Per Gross Value of Output
Base Year	2001	1986-87	1986-87	2011	2004-05
No. of centres/Villages	78 Centres	600 Villages	600 Villages	Rural Villages 1,181, Urban Centres 1,114	NA
No. of Markets	289	1461	1461	As above	5482
No. of Items in consumption Basket	175-200	260	260	RuralCPI-175 UrbanCPI-200	676
Price Quotations Collected by	Field Officers of Directorate/ Bureau of Statistics of Labour Departments	Officers of NSSO	Officers of NSSO	Officers of Department of Posts	Online Survey and various Ministries
Index Released for	78 centres and All India	20 States and All India	20 States and All India	All states/UTs and All India	Single for All India
Periodicity of Index	Monthly	Monthly	Monthly	Monthly	Monthly

Now the real challenge for the policy makers is to use an ideal index for the conduct of (monetary) policy. An ideal index number used for the conduct of the (monetary) policy may be expected to satisfy two major criteria. First, it should track the purchasing power of the average consumer in the economy (Diwert, 1998). Second, it should broadly capture the movement of general prices in the economy with the significant level of accuracy and should also be internationally comparable. The comparability of inflation indicator is of greater importance, because of the greater integration of the world economies. There are some measurement related issues in price indices, which mainly includes coverage, weightage system, and accuracy of the price indices. These issues are the real challenges for the policy makers as what type of index should be chosen for policy purposes.

In this connection, there is a need to develop such an index which should overcome all the major limitations of the existing indices, by accommodating the quality and quantity changes of new products, the inclusion of a major section of the population, updating the base periods, and have uniformity among the data collecting agencies.

2.4 Theories of Inflation

In view of the gravity and complexity of the phenomenon, there can be no single theory of inflation. In general, one can identify a number of specific theories which emphasise on one or other factors in explaining origin and persistence of inflation under the background of conditions prevailing at the time of its formation. Inflation, like a severe worldwide phenomenon, is a popular topic for discussion, but its origin and causes are the subject-matters of much debate especially when policy issues of the government are concerned. That is why no unique theory of inflation has been forwarded yet, though a number of theoretical approaches explaining inflation are available and a more of them are still coming up. The fact is that the causes of inflation differ from economy to economy depending upon the particular economic, social and political setup of the economy concerned. Or in most of those theories, the causes of inflation have been condensed into a smaller number of determinants in order to simplify the inflation process.

We have mainly three types of economies in the world viz, capitalist advanced economies (such as USA, UK, Japan, France etc), socialist advanced countries (such as USSR, Romania, Czechoslovakia etc.) and less developed economies i.e. LDC's (including most of the Asian, Latin American and African economies and some other European countries). In these economies, many theories have been advanced to explain the different causes of inflation. These theories may broadly be classified into three major groups: (i) monetary/ expenditure theories which are based on aggregative expenditure generating process across all sectors of the economy and lay stress on excess demand, (ii) theories that primarily emphasise on increase in input costs of production, (iii) theories that emphasise on the imbalances originating in particular sector of the economy because of structural rigidities. The monetarist or the quantity theory and Keynesian demand-pull theory belong to the first group while the 2nd group is associated with cost push theories, and the third one the Structuralist School of thought. A brief write-up on the opinion of these theories on the dynamics of inflation is provided in the following section[7].

2.4. 1 Excess Demand Theories of Inflation

All the trends of thought which reflect inflationary price rise in terms of change in the aggregate demand comes from excess demand theories of inflation. Monetary version and the Keynesian demand pull version belong to this group. According to monetarists, the excess demand for commodities is generated by the excessive growth of money supply in relation to the growth of real income. While the Keynesian theory of inflationary gap relates the emergence of excess demand with the growth of aggregate expenditure in connection with the growth of output. Thus, the difference of both the theories in the context of excess demand lies in locating the cause of the same.

2.4. 2 Classical Approach to Inflation

The classical (e.g. Adam Smith, David Hume, David Ricardo, and John Stuart Mill) and the neoclassical Schools (e.g. Alfrad Marshall, A.C. Pigou, Irving Fisher)

[7] In order to be able to follow the development over time in explaining inflation we have tried to follow more or less a chronological order in comparing the opinions of the different theories of inflation instead of adopting other general criteria such as demand –pull theories vs. supply-pull theories, long-term vs. short-term theories,
etc.

state that inflation is monetary phenomena(Snowdon and Vane, 2005). In other words, it is the excess supply of money *cetirus-peribus*, that results in the general increase in prices. As in the traditional quantity theory as put forward by Fisher, money is simply treated as a medium of exchange under full-employment conditions. There are two highly influential versions of the quantity theory of money; the Cambridge cash-balance approach and the income version of Fisher's equation of exchange. The identity of both versions is more or less identical, and both lead to the same results in explaining the quantity theory approach on inflation process. Using Fisher's version (1911), the quantity identity is given by the following relationship:

$$MV=PY$$

M is money stock and it is supplied by the authority, so it is exogenous. **V** is the velocity of money and represents the average number of times a unit of money is used to finance/conduct transactions. **P** represents the general price level, and **Y** is the real aggregate income in the economy. Furthermore, **Y** is assumed to be pre-determined at its full employment level by the equilibrium in the real sector market, and as **V** is constant. Hence we are left with the presumption that the price level (P) is increasing the function of money supply (M). Therefore, as per the classical school, it is the money contraction policy that should be used primarily as a tool to fight against inflation (Handa, 2000).

2.4.3 Keynesian Approach to Inflation

Keynesian analysis to the inflationary problem which mainly stems from 'General Theory' (1936) and 'How to Pay for War' (1940) provides an approach to inflation in terms of excess demand framework through the application of a saving-investment gap. Prior to these writings, in 'Treatise on Money', Keynes introduced the concept of profit inflation on the basis of a dual sector model from the angle of saving and investment condition in which the process of inflation can be said to flow from a boom on capital market, causing investment to exceed saving in a given supply situation (J. M. Keynes, 1930). Hence 'Treatise' did a great service to the analysis of inflation by drawing attention to the intimate relation between investment, boom, profits and savings (P. R. Brahmananda, 1974). However, in his well-known booklet 'How to pay for War', Keynes dealt with the problem of inflation clearly in terms of

national output, war expenditure and aggregate consumption. At the same time, we may trace two different approaches to the mechanisms of inflation in the writing of Keynes in respect of 'General Theory' and 'How to Pay for War'. While the former emphasises inflation is originating from a state of excess demand in an economy, the latter reflects the inflation as a result of an autonomous increase in costs. In fact, the saving- investment equilibrium condition which provides a direct approach to the question of inflation is essentially based on short period consideration when money flow rather stock becomes a crucial variable.

The theory of inflation, implied in Keynes General Theory of is an extension of Wicksellian model (1935), under a background situation of full employment and less than full use of capacity in the economy. In a condition of under-employment when an increase in investment, rising prices are accompanied by an expansion of output and employment, it cannot be termed as inflation. When full employment is approached, prices may rise, and after full employment, any increase in investment would directly lead to a rise in prices. In addition to this, an economy may experience inflation even with a constant '**M'** if consumption or investment propensities rise under the conditions of full employment. Here is the main difference of the thought between Wicksell and Keynes. While, according to Wicksell, an increase in money supply without a corresponding rise in productivity of the economy may create an inflationary situation, Keynes maintains that the rise in prices may take place even without any increase in the quantity of money. Thus, the basic proposition of Keynes model of inflation is that money does not matter in the short run. The transmission mechanism of the money supply is an indirect process working through the cost of the capital channel via the rate of interest. Hence, Keynesians hold that the interest elasticity of demand for money is infinite. The effect of changes in money stock depends only on the slopes of liquidity preference or marginal efficiency of investment curves (J.Tobin, 1957).

Another important is the concept of inflationary gap model which was originated by Keynes in 'How to Pay for the War' (1940) by functionally relating expected expenditure to disposal income in relation to the available output at base prices. This implies that an increase in money flow without a corresponding increase in real output will open an inflationary gap between the two flows at full employment

level. Thus, the excess of aggregate demand over aggregate supply leads to a rise in wages and prices. Essentially, inflation gap is equivalent to an unexpected increase in demand within an economy operating at full employment. Initially, therefore , such a shock in demand will result in higher prices and in anticipated profit for firms, due to primarily the assumption of rigidity in normal wages (Aykut, 2002). Firm's action to meet the excess demand will create pressure on the labour market, which is already operating at full capacity. This will cause a competition between firms for employed workers, which will bid up normal wages and subsequently the real wages, which in turn will induce a new demand in goods market leading to another increase in prices. If normal wages continue to lag in response to any excess in demand, an inflation spiral is expected to occur. The problem of controlling inflation, therefore, is one of the demand management. Thus, Keynesians have a non-monetary theory of prices. They do not consider money supply an exogenous variable which has no effect on real variables, notably on output in the long-run. Hence, Keynesians demonstrate that fiscal policy which is concerned with the aggregate demand has a significant effect on income, employment and output in the short run, even in the absence of new supply of money.

2. 4. 4 Monetarist's Approach to Inflation

The monetarist school led by Milton Friedman postulates that monetary impulse is the major factor for variation in output, employment and prices both for short-run economic fluctuations of the economy and for the inflationary trends of prices. In fact, the proper growth of money stock is crucial for stable growth path of output and prices from the angle of long-run when all expectations are actually realised. Short-run is marked by unanticipated change under which money supply will affect the output within five to ten years. Whereas, in the long-run money supply will change mainly prices within a time period of more than a decade (Friedman. M, 1970. pp.22-24). Change in money supply, therefore, affects the long-run stock of real capital and hence output and bring about changes in prices or income or both in the same direction.

Thus, the output is taken as fixed datum, and the price level is regarded as a variable to be determined by economic system (Friedman. M, 1971). Thus, monetarists concede a direct relationship between the money supply and price level

which is proportional in the long-run. They claim that there is a specific supply of money which is consistent with the price stability. If the actual supply of money exceeds that quantity, people exceed their expenditure to get rid off from excess money and inflation results in the process (Freidman. M.1968). Hence, inflation is purely a monetary phenomenon, and market mechanism or price operate as an efficient allocative mechanism in the economy. Milton Friedman takes into account a stable demand function for money in real terms as the basic postulate of the quantity theory model of inflation. He has clearly stated, "The Quantity Theory" is in the first instance a theory of demand for money. It is not a theory of output, or of money income or of the price level (Friedman.M.1970) the determinants if demand for money is a level of income, wealth, the rate of interest, rate of change of prices and rate of return on alternative forms of assets.

The theory implies the existence of stable demand function of money in which the expected rate of inflation appears as a cost of holding real balances. And given this function, the rate of increase in the nominal stock of money determines the rate of inflation. In the initial phase the rate of inflation is likely to be less than the rate of increase in money supply owing to the persistence of belief in the stability of prices, and after for a period the rate of inflation is likely to exceed the rate of increase money supply owing to effect of growing belief in the continuance of inflation in reducing the demand for real balances. In such a period in which the cost of inflation is apparent, peoples holding of stock of goods instead of money will be increased up to the point where the alternative rate of return on the real resources substituted for the use of money is equal to the rate of inflation (Johson. H.G, 1978). Therefore, people change their portfolio of assets in order to possess the optimum amount of real balance. Hence, monetarists concede that initially, a change in money supply would influence the rate of interest in opposite directions, but this would subsequently be reversed as expenditure increases. The change in expenditure first affects real magnitudes and then only prices.

Money is thus treated as an asset in the portfolio structure of the monetarist model. The demand for money is akin to demand a luxury like durable consumer goods which has a value of income elasticity greater than unity. In fact, monetarists have the notion of regarding money as an only asset and the real balance effect and

wealth effect is not tantamount (Douglas, D. Purvis, 1980). Hence, the monetarists have a monetary theory of price level in which money is basically regarded as neutral in long-run in the sense that it does not disturb the real equilibrium of the system and also maintains the real rate of interest. Since money is exogenous in their model, monetary policy is effective in controlling inflation by restricting money supply.

2.4.5 Cost Push Theories of Inflation

Theories of cost push inflation came to be put forward after the mid-1950s. Cost-push theorists generally attribute inflation and disinflation to some non-monetary, supply-side elements that influence the unit cost and profit markup component of prices of individual goods (Humphrey, 1998). They appeared largely in the refutation of demand pull theories of inflation, and emphasised, instead, autonomous increases in some important component or other costs as the true source of inflation. The cost-push type of inflation may be initiated either by strong trade unions or by large business monopolies or by both at a time to push their wages or profits respectively in a period of moderately high but not clearly excessive demand to extend that cause undue upward pressures in the general level of prices. Inflation in the context of cost-push analysis is variously termed as administered-price, 'markup' or 'income share' inflation. The cost push hypothesis is generally conceived as being synonymous with wage-push.

The wage-push thesis of cost inflation holds that when the wage level rises faster than the rise in overall productivity, prices are bound to go up if the level of employment is to be maintained. Such autonomous wage increases, engineered by strong trade unions, make producers bid up prices of their products in the promotion to wage increases. This creates a vicious circle of prices and wages, each chasing the other in an upward direction. The theory thus assumes that the wages are not strictly market- determined prices but administered prices. Given an initially stable wage structure, an inflationary stock is administered when one organised group tries to increase its wages relative to wages of other groups. This leads other organised groups of labour to try to regain their relative status in the wage structure. This process intensifies the 'wage-wage spiral' which in turn, generates an upward trend in the nominal wage level as a whole (John Buton, 1972). The process continues as long as frustrated groups try to change monetary arrangements to suit their economic

objectives. The process stops when everyone adapts to the new monetary arrangements (Henry Aujac, 1954). Thus, inflation is the by-product of a struggle over income distribution in which entrepreneurs and wage earners fight to preserve or increase their share of national income by using whatever 'market power' they can summon up (Ackely Gardner, 1972).

Major contributions to the theories of cost push inflation are the works of Harold G. Moulton (1960), Sidney Weintraub (1963) and P.Wiles (1973) who have rejected the importance of demand factor over-rate the importance of cost-factor in the determination of price level. Moulton holds that long run price level, on the one hand, are shaped primarily by cost-increasing effect of upward drift in money wages and on the other hand, the cost-reducing impact of improvement in the labour productivity .price stability in an economy, therefore, is only possible in the presence of a better balance between the rate of wage increase and the rate of productivity. While according to Wiles the rate of change of prices will be determined by the rate of change of money which, in turn, depends on upon the strength and action of the Trade Union leaders. Thus, the level and rate of price changes are determined by the action not by the monetary or fiscal measures but by Trade Union fiat.

Sidney Weintraub has developed an alternative explanation for the determination of price level in terms of his 'Wage-Income theory' which is useful in particularly in explaining the variations in the sectoral price level. He formulated a 'Wage-cost markup' equation of price level according to which the cost of every commodity is equal to units of labour embodied in the commodity, with the provision for computing at the ruling rate of interest. Thus, it is based on pure labour as the sole input or its service in the ultimate sense in production (Brahmananda, P.R. 1974). The theory holds that with a change in the average wage per worker a direct a proportionate change in the price level is postulated. For inflation control, appropriate policy according to him, is to keep the increase in wages within the limits of gains in productivity.

2.4.6 Sectoral-Demand Shift Theory of inflation

The sectoral-demand shift theory of inflation was set up by Charles L. Schultz (1959). The model postulates that, as demand substantially shifts from one sector to

another, and as the prices in the sector from which demand has shifted fail to decline to bring about the required relative price change, prices in the sector to which demand has shifted rise. Though this theory does contain an element of truth and does not contribute to our understanding of the inflationary process as well as the inflationary bias of modern economies, it does not offer a complete or even a substantial explanation of continuous inflation, for which a much stronger force in the form of demand-pull and or cost-push is required than mere shift in demand.

2.4.7 The Structuralists Approach to Inflation

The Structuralist approach to the inflation which has rapidly gained acceptance in the developing countries like India originated mainly from the Latin American countries. This approach to the inflation signifies a marked departure from the monetary hypothesis of inflation in respect of price behaviour in developing economies and its policy measures for reduction and control of inflation in these countries. In fact, all versions of the structural school, one common strand is that inflation is a manifestation of economic and social change which is attributed to the 'structural vulnerability' of developing economies (Robert de Olveira Compos 1964). The Structuralists essentially relate the inflation process to a special set of structural constraints faced by each economy [8]. In their distributional mechanism, the Structuralists assumed that the changes in economic structure induce changes in relative prices, which in turn lead to changes in the general price level (Aykut, 2002). Hence, the structural bottlenecks and basic rigidities in an economy cause the phenomenon of rising prices. To the Structuralists, it is growth through which the structural bottlenecks and basic rigidities of the economy can be removed and consequently the line of operation can only cure inflation in developing economies. Therefore, to understand the true nature of the inflation in developing countries, one must go to the forces that tend to generate bottlenecks or gaps of various kinds in the normal process of development, study how the bottlenecks lead to price increases and how these spread to the rest of the economy. The essentials of their arguments can be summed up in two main propositions: (i). That whereas inflation in developed economies is associated with full employment policies and the labour market response to these policies, inflation in developing economies is bound with the developmental

[8] The constraints may be in the form of equal and unequal income distribution, the relative importance of certain sectors in the economy like the agriculture sector, and balance of payment disequilibrium.

effort and the structural response to this effort expressed through bottlenecks or gaps of various kinds in these economies; and (ii). That the socio-economic-political structure of a developing economy determines the source and character of inflation by determining the particular kinds of sectoral demand-supply gaps or bottlenecks that emerge in the process of development. The gaps and bottlenecks that have attracted maximum attention in the literature are as follows;

Resource Gap: In the race of development most of the under developing countries trying to industrialise themselves through the public sector. But the socio-economic-political structures are such that the government is not able to raise resources through different sources of revenue. Under this situation, there is excessive dependence on deficit financing, which results in an excess increase in money supply year after year, which tends to be the proximate cause of inflation. The resource gap in private sector puts further pressure on the institutional mechanism leading to the excess expansion of the money supply and bank credit (Krishnaswamy, 1976).

Agricultural Bottlenecks and Sectoral Imbalances: The inelasticity of agricultural production particularly food production in the face of growing demand, on the one hand, is largely due to the defective pattern of land tenure which decreases the responsiveness of food production to price stimuli. Now, on the other hand, the increase in the consumer purchasing power (is not as) a result of an increase in per capita income during the process of development which generates enormous additional demand for food in these economies. Thus, it is evident that once food prices are up, it would lead to demand for a rise in wage rates resulting in a compounding of original demand inflation with the secondary cost-push type of inflation which generates the phenomenon of the price-wage spiral in the economy. Besides this, the agriculture sector is not only associated with the supplies of food but also a substantial part of raw material required by the manufacturing sector. In fact, the agriculture sector is not in a position to provide adequate quantities of raw materials to manufacturing sector during the period of rapid industrialisation which leads to sectoral imbalances between agriculture and manufacturing. Thus, this hypothesis clearly reflects a basic weakness in the external sector of the developing economies, because of which economic growth is most likely to produce rising import prices in terms of domestic currency.

Foreign Exchange Bottlenecks: According to this hypothesis the export capacity of developing countries is limited due to the slow and unstable rate of growth of exports along with inelastic demand from primary products in the international market as a result of a change in the pattern of demand in importing countries. Thus, the fluctuations in export receipts create a long-run upward movement in the price level (G. Maynard, 1966). Under these conditions, the domestic availability of goods in short supply cannot be easily improved through imports, the prices of such goods increases and the increase spreads to other prices.

Infrastructural Bottlenecks: Due to resource and foreign exchange gaps, rampant inefficiency and corruption and faulty planning and plan implementation, most developing economies have come to face severe infrastructural bottlenecks in the field of power, transport, etc. This holds back the development of other sectors, created underutilised capacity in the economy which in turn discourages further investment in the economy. Since most of the infrastructural facilities lie in the public sector, and due to the resource gap already considered, the government is not in such a position to devote enough resources to the adequate growth of these facilities, the rate of development of entire economy gets arrested. Therefore, even small increases in expenditure get converted into excess demand pressures and generate inflation.

Another version the cost-push theories include those presented by some non-mainstream economists including Marxists, Post Keynesians, and Neo-Structuralists (Lavoie, 2009). Inflation theories of these groups are broadly based on a similar proposition, in which inflation is considered supply-side phenomena caused by conflicting claims in income distribution. As a result, they generally maintain a similar propagation mechanism that implies changes in relative prices, which in turn set off a persistent inflationary process.

2.4.8 Fiscalist's Approach to Inflation

The Fiscalist's theory[9] of determination of the general price level was developed during the 1990s. In their literature, they argued that the general price is essentially a fiscal, rather than a monetary phenomenon (McCallum, 2003). They consider the sequences of the primary government deficits and surpluses to be the

[9] The Fiscalist's are led by M. Woodford, C. Sims, J Cochrane, and E. Leeper

main determinants of the general price level. In their opinion, fiscal shocks affect aggregate demand through the intrusion of the former upon private sector budget constraint. Accordingly, they had viewed the commitment of the monetary authority to conduct a rule-based monetary policy as insufficient to ensure a stable and low equilibrium rate of inflation.

However, in the developed economies with sophisticated financial markets and an independent central bank, which commit to specific inflation path and need not accept seigniorage targets imposed by the treasury, the strong form of the fiscal policy is suggested as being the dominant form. The strong-form (????) of the fiscal policy, for which the development is primarily attributed to the fiscalist's of late 1990's, assumes the ability of the fiscal policy to induce changes in prices independently of monetary policy. In this form, both the fiscal and monetary policies (not policy) are assumed to be exogenous and that the prices will have to adjust to a level satisfying the government's budget constraint, which will link the real value of the debt to the present value of primary surpluses, the government will run in future. Proponents of fiscal theory view this link as an equilibrium condition. It follows that any imbalance between the real value of the debt and the surpluses would trigger price adjustment in the form of increasing or reducing the nominal debt (Bassetto, 2002).

$$D + S(\pi) = {}^{B_0}/_{P_0}$$

The above equation represents a government budget constraint, where $S(\pi)$ represents the present value of seignorage, D is the present value of future primary budget surplus, B_0 is the accumulated government debt time zero, and P_0 is the corresponding nominal price level[10]. By assuming fixed money supply, there would be no future seignorage revenues and subsequently the above equation will be reduced to the form given by the given equation:

$$P_0 = {}^{B_0}/_{D}$$

[10] Note that we have purposely opted to use very simplified and non-technical analysis to bring very closely the idea of strong form fiscal theory. However, more comprehensive and technical form can be found in Bassetto (2002), Carlstrom and Fuerst (2000), McCallum (2003), or Woodford (2000)

The above equation implies that fiscal policy determines the current price level and the path of prices. A change in fiscal policy (D) changes current prices (P) by changing the path of future inflation. For example, a rise in the discounted value of future surpluses reduces current prices and future inflation; therefore, the strong-form of fiscal theory, in which fiscal policy can affect the price level and the path of inflation independent of any movement of the money stock. A major implication of strong-form is that anti-inflationary monetary policy rules with a low implicit target are not sufficient to ensure price stability as disturbances from fiscal expectations, by the rational economic agents regarding government budget constraint, may prevent such stability from occurring. Accordingly, it is suggested that for the achievement longer-term price stability monetary policy should be coordinated with fiscal policy.

2.4.9 New Political Macroeconomics to Inflation

Incorporating the influence of political system into economy thereby giving rise to the so-called "new political macroeconomic" based on some insights from game theory and the theory of public choice[11]. These studies are interested in understanding the impact of the interaction between the economic and political systems and macroeconomic variables such as inflation, employment and output. It is generally argued that the governments of the countries with higher political instability tend to face higher inefficient tax system and rely heavily on inflationary financing as compared to democratic systems (Cukierman *et. al,* 1992).

In the traditional economist's approach, particularly the Keynesians, the policy makers who represent the government had been assumed to act to maximise social welfare. The government is thought at least generally, to be 'benevolent social planner' who would always try to pressure economic policies that were in the interest of society (Snowdon and Vane, 2005)[12]. Further, as per traditional approach, the relationship between the economist and the politician/policy maker was assumed to such that former is expected to offer economic advice based on well-structured analysis to the latter, who is expected to follow unbiased well-informed advice

[11] Major contribution includes studies by A. Alesina, A Drazen, D. Hibbs, W. Nordhaus, K. Rogoff, F. Schneider, A. Shleifer, and B. Frey.

[12] For the summarization od such policy making processes of traditional approach see Killick (1976), "The Possibilities of Development Planning"

provided by the former in maximising the societal welfare. However, in realities studies have shown (see Alesina, 1988, Alesina and Roubin 1997, Drazen, 2000) that different roles are usually taken by the governing politicians particularly in societies that feature the presence of different classes, interest groups, political parties and voters. In such heterogeneous societies, the policy making is assumed to be mainly influenced by the forces of those divisions and biased insights, while those of his economic advisories are regarded as secondary. In the new political economy theory, the government and economic agents are seen to be engaged in a complicated dynamic game, under which any monetary or fiscal policy announcements for low inflation is subject to the credibility and reputation of government (King and Ma, 2001, Snowdon and Vane, 2005).This reputation and credibility of the government create the illusionary types of favourable macroeconomic environment and non-availability long term vision and mission for the economic development.

2.5 Conclusion

Thus, above survey of the theories of inflation clearly shows that different hypothesis has been advanced by different theories over the last two centuries concerning the creation and acceleration of inflation. Such enormous efforts reflect how inflation has been a central concern to macroeconomists. However, despite this rich literature on inflation, the basic determinants of inflation continue to be disputed by economists of different schools. This diversity in approach to the analysis of inflation and none of the approaches in its pure form is competent enough to explain the dynamics of inflation in the context of the institutional characteristics of Indian economy and the structural changes. An eclectic view, therefore, should be taken to be a desirable approach in analysing inflation with particular reference to the Indian economy in the light of useful and relevant ideas from the existing schools of thought.

From the theoretical survey of the literature, it can be inferred that the theoretical causes of inflation generally fall into four groups: demand side factors, supply side factors (cost-push), inertial factors (built-in inflation), and non-economic factors (political, etc.)[13].

[13] The first three are close to Gordon's theory (1997) if 'triangle model of inflation'.

It is here important to note that the present study will not make an attempt to develop a new model of determinants of inflation. In other words, we will not develop such model which will help us to incorporate the new factors/variables that are affecting the Indian inflation. However, the present study will take the above-mentioned theories into consideration and will try to understand the nature and compositional pattern of inflation determinants. It is because of the fact that despite a huge number of studies and a large number of policy changes from time to time the developing economies in general and the Indian economy, in particular, is unable to anticipate inflation and unable to control it.

CHAPTER 3

Food Inflation: A Compositional Analysis

Food inflation is one of the most critical economic problems in the country today and the ability to control prices of food articles quickly and effectively is one of the main basis on which people judge the performance of the Government. In the recent years, food price inflation has risen very sharply not only at national level but at the global level too. Reduced level of poverty, increase in per capita income and urbanisation of poverty, an increase in per capita income and urbanisation are the main reasons for the sharp increase in demand and prices of some basic food items. Higher and more volatile food prices threaten food security by diminishing the ability of people to access food when they need it. In particular in India, sudden and large food price increases—by eroding household purchasing power—complicate their efforts to adjust and often result in reduced calorie intake and deteriorating nutritional content, in turn pushing more people into poverty. Food inflation in India has become a contentious issue, for obvious reasons. This is happening alongside a very impressive growth of the Indian economy and a significant increase in per capita income over the last several years. The economy is growing at more than eight percent per annum and per capita income has doubled in the last few years. This has given birth to an argument that one of the major factors for food inflation is sustained economic growth – which is critical for an emerging economy like India, with a large number of poor – over the last few decades. Food inflation has become a major cause of concern for not only the common man but also for the policy makers. In economics, inflation is a rise in the general level of prices of goods and services in an economy over a period of time. A correct diagnosis of the factor underlying this inflation is needed to assess whether prevailing policy responses to rising food prices have been adequate and to formulate ongoing suitable responses. If the inflation is due to supply shocks then, it seems to the general consensus among policy makers which should be ignored. On the other hand, it is due to demand overheating then monetary policy should be tightened severely. However, if the food price situation corresponds to neither demand overheating nor supply shocks but to a different set of circumstances, then appropriate policies for these circumstances options need to be

explored. As a general public, everyone has question in mind why the prices of the food products are not declining in spite of the fact that the inflation is declining?

There have been many studies, which have raised the issue of food inflation and the factors responsible, both at national as well as at international level. Mitchell (2008) argues that biofuel production from grains and oilseeds in US and EU accounted for as much as two-thirds of the price increase in theses commodities between 2002 and 2008. Gilbert (2010) finds little evidence that price spike during this period was driven by heightened demand for grains and oilseeds as a biofuel feedstock. Another aspect of the food inflation revealed from the literature is the surge in demand for grains in the emerging economies such as India and China. Krugman (2008) pointed out that the rise in per-capita income in several emerging markets has shifted the dietary habits of citizens towards meat, which in turn has raised the demand for the grains as animal feed. At the same time, the high growth in these economies has made them more energy intensive and thereby increased their demand for fossil fuels, whose prices also witnessed a steady increase and which is a major input for agriculture. In the context of high food inflation in India, it has been argued that supply side constraints causing high food inflation were rooted in slow growth in the agriculture sector(Carraso and Mukhopadhyay, 2012; Desi et al. 2011, GOI, 2012, Chado 2010). Nair and Eapen (2012) in their study by undertaking the wise commodity analysis concluded that supply side constraints and cost are escalating factors were the major drivers of inflation in major commodities and discarded the view of a shift in consumption pattern towards high-value agriculture products. Mohanty (2014) also favored the supply side constraint responsible for food inflation because of increase in input costs along with fuel and fertilisers, cause by high international oil prices combined with the exchange rate depreciation. (Balakrishanan, 1994), concluded that in the case of the industrial sector the main culprit in determining the inflation is labour and raw material costs, while in the case of agriculture sector prices of food grains were determined by per-capita output, per capita income in the agriculture sector and government procurement of food grains. Naveed and Yadav, (2013), argued that the rise in the per capita income of poor due to the implementation of inclusive growth model lead to a rise in the demand for food products along with stagnant per capita availability of these commodities lead to increase in food prices. Kumar *et al. (*2010) argued that in escalating the food

inflation in India various structural and contingent factors such rising gap between per capita incomes, decline in food availability, the resultant rise in demand for food products. Sasmal (2015) concluded that the rise in per capita income and failure of agriculture production to keep the pace with growing demand had added fuel to the food prices. Some studies also revealed that minimum support price (MSP) has its role in escalating the food prices. Bhall et al. (2011) empirically concluded a strong link between MSP and food inflation India. They found that with a 10% rise in these prices resulting 3 percentage point rise in CPI inflation.

Now the obvious questions that despite these numbers of studies and many others, why food inflation is still a big challenge? Why there is not a consensus among the researcher and so the policy maker what actually determines inflation? Is there any change in the nature pattern of food inflation? Is there any compositional shift in the determining factors of food inflation? If there is so, are the policy makers taking into account the same changes into their policy framing? In this chapter, the attempt is to answer most of these questions.

3.1 Nature and Pattern of Food Inflation

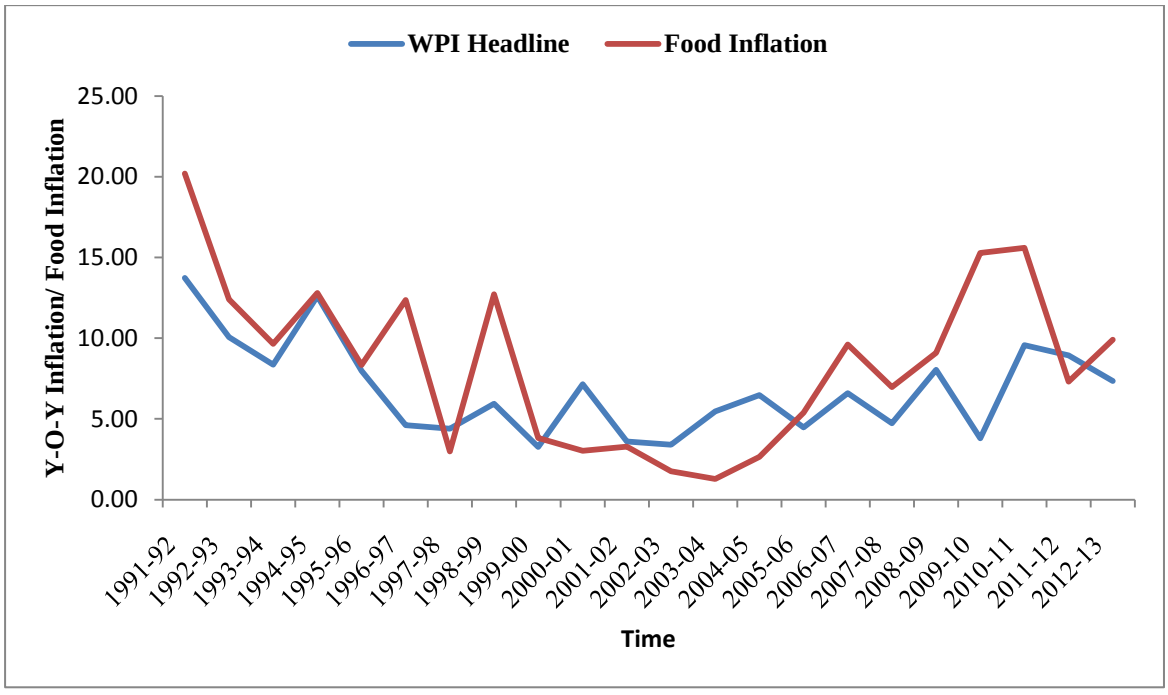
The inflation rate in India was recorded at 7.45 percent in October of 2012. Historically, from 1969 until 2012, India's inflation rate averaged 7.8 percent reaching an all-time high of 34.7 percent September of 1974 and a record low of -11.3 Percent in May of 1976. Inflation rate refers to a general rise in prices measured against a standard level of purchasing power. Food inflation is a rise in the general level of prices of food articles in an economy over a period of time. When the price level rises, each unit of currency buys fewer goods; consequently, inflation is also an erosion in the purchasing power of money – a loss of real value in the internal medium of exchange and unit of account in the economy. Food inflation in India has become a contentious issue, for obvious reasons. This is happening alongside a very impressive growth of the Indian economy and a significant increase in per capita income over the last several years. The economy is growing at more than eight percent per annum and per capita income has doubled in the last few years. This has given birth to an argument that one of the major factors for food inflation is sustained economic growth – which is critical for an emerging economy like India, with a large

number of poor – over the last few decades. Food inflation has become a major cause of concern for not only the common man but also for the policy makers.

Food prices were the biggest contributors of inflation, although core inflation (calculated after removing food and energy prices) was trending up in most countries. In fact, in India core inflation was driving overall inflation in 2010, although food inflation was the biggest contributor to inflation in the years prior to 2010. Food inflation in India has risen every year since 2007, notwithstanding the see-saw trajectory in global commodity prices over 2007–09. Non-cereal prices are rising fastest during the current food inflation episode, unlike during the last such episode in 2007–08, when cereal price increases were responsible for a larger share of food inflation. In India, the recent surge in food prices is due to a spike in fruit and vegetable prices, which increased by 22.8 percent. Items such as milk, eggs, meat, fish and spices also experienced double-digit inflation rates.

The overall year on year inflation in India as measured by wholesale price index (WPI) of all commodities was 6.95%, and food inflation was 8.35% for the period 1990-91 to 2012-13, (figure 3.1).

Figure 3.1: General Price level and Food inflation from 1991-92 to 2012-13



Source: CSO, MOSPI

It is interesting to note that despite the fact that the food price index contributes only 14.38% in the wholesale price index (2004-205=100), but still it is always contributing a lot to the general price level. In other words, food inflation is always above the general price level in the sample period. The estimates show that the primary articles contributing 20.12% in the whole WPI (2004-05=100) but their contribution to the inflation is more than 36% against the manufactured products contributing almost 65% of WPI, but the share in inflation is only 23.53%. The respective average year-on-year inflations of the i.e. general price level, food price and manufactured price level is 6.95%, 8.53% and 5.57%.

Table 3.1: Compositional Pattern of Indian Inflation1991-92 to 2012-13

	WPI	**Primary Articles**	**Fuel & Power**	**Manufactured Products**
Weightage	00	20.12	14.91	64.97
% Share in Inflation		36.05	40.41	23.53
Average Inflation Rate	6.95	8.53	9.56	5.57

Source: http://eaindustry.nic.in/

The analysis of food inflation becomes more relevant when we are trying to estimate the components of the food inflation and how they have been changing over the period. The analysis compositional aspect is one of the best ways to understand how the compositional scenario has changed over the period of time. The table 3.2 below shows the share of different components in of food price index also the share of respective components in the food inflation.

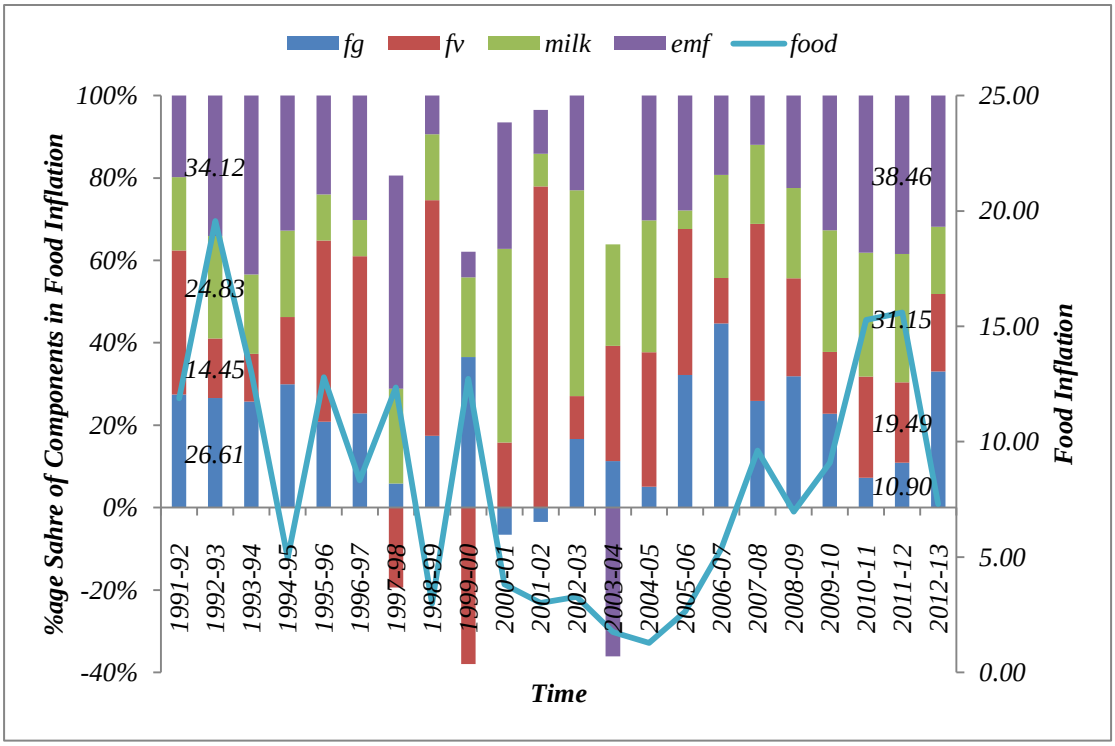
Table 3.2: Components and Percentage share in food inflation 1991-92 to 2012-13

	Weigh tage	Percentages Share in WPI of Food	Percentage Share in Food Inflation
Food Articles	14.38 %		
Food Grains (Cereals +Pulses)	4.09	28.53%	23.24
Fruits & Vegetables	3.84	26.80%	27.53
Milk	3.24	22.59%	21.61
Eggs, Meat & Fish	2.41	16.84%	27.61

Source: Estimated by Author from WPI (http://eaindustry.nic.in/)

It is interesting to note that during the study period, factors having the lowest share in the WPI of food are contributing highest in food inflation while as those having and vice versa.

Figure 3.2: Component-Wise Percentage Share of Food Inflation1991-92 to 2012-13



Source: Authors Estimates from WPI

Here it is clear in figure 3.2, as mentioned earlier in the introductory chapter of the thesis that the general price level in the post-reform has shown a U-shaped inflation curve. The food inflation is somehow showing the same pattern as the general inflation. But, what is most important to note from here the way the nature of components of food inflation changed over whole reform period. This shift has taken place in over the period of time, despite having two high inflation periods of early reform period and the latest reform period. Going through the data, it is revealed that the components egg, meat and fish (emf) with least weightage of only 2.41% in the WPI of food, but contributing almost 39% in the food prices in the recent surge of food inflation, while as with the same share in the early reform period it was only 34%. Same is the case with milk, fruits and vegetables (milk, fv). While as in the case of food grains (fg) the story is different despite having highest weightage ((4.09) among the components their share in the food inflation is dramatically decreasing contributing almost 27% in the food inflation in the early reform period, while as of now they are contributing only 10%.

It is revealed from the above data that there is a dramatic compositional shift in the nature of food inflation determinants. The factors having higher weightage are contributing less in the food inflation while those having lesser weightage in the food price index are contributing a lot. This dramatic shift must have policy implications, and that may be the one major reason that the policy framing is unable to cope up with the surging of food inflation. This is because the policy variable is framed in such a way that those having higher weightage are hit with priority but their contribution in the inflation is less, so this may lead to a big loophole in the policy farming.

3.2 Determinants of Food Inflation: A Review of Literature

The persistent food inflation in India and factors responsible for this persistence has been very well unearthed. The enormous number of empirical studies has tried to explain this surge either demand side, supply side or via some other factors. We will try to make a brief summarise of these studies:

3.2.1 Demand Side Factors

One popular explanation for the higher food prices in recent years is the rising demand for high-value agricultural products like pulses, milk, livestock, fishery, vegetables, and fruits, in turn, are attributed to rising per capita income and the consequence diversification of Indian diets. (GOI 2011a: RBI 2011). As the supply response to growing demand in high-value agriculture products has been a week. Their prices continued to remain high thereby providing a new structural character to the food inflation in the recent years.

As far as demand side is concerned, rising income especially rural farm wages (Chand, 2010; Mohanty, 2013) and increase in real consumption (Mohanty, 2013) are highlighted as major reasons. The Indian economy after the reform era has seen a dramatic transformation and fast growth in the economy. This growth has led to rapid expansion in the Indian middle class and has been cited as a major cause for the rise food price in India in recent years. Mohanty(2011) demonstrates that average annual, monthly per-capita expenditure has risen faster in the second half of the 2000s than in the first half. Though the share of per capita food expenditure has decreased during this period, there has been a clear structural shift in food consumption (as shown above) towards protein-based food items in the recent years. Accordingly, the prices of these commodities have increased at a higher rate than that of others. Since the supply of these products have not been able to meet corresponding demand (Mohanty, 2011 and 2014), and created a demand pressure and lead to increase in the food prices. The same pattern of a structural shift in the food consumption and hence exerting a demand pressure has been prevalent in the studies, Subbario (2011), Rajan (2014) and Gorkan (2010 and 2011).

Another source of demand inflation is expansionary income support offered to the poor through schemes, such as Mahatma Gandhi National Rural Employment Scheme (MGNREGA), pay commissions and other social welfare schemes. These schemes and programs have infused a substantial amount of liquidity and purchasing power generating increased demand for food items (Rakshit, 2011; Ministry of agriculture, GOI). Some analysts also pointed out that the genesis of prevailing higher inflationary spiral can be attributed to the lagged impact of monetary and fiscal

stimuli provided by the authorities to tide over the global financial crises (Rangaranjan and Sheel, 2013; Reddy 2013).

3.2.2 Supply-Side Factors

One of the traditional explanations for rising food prices has been the supply-side shocks related to weather either because of droughts or floods. The drought lead high food prices have contributed significantly to seven out of nine double-digit inflation episodes (between1956 to 2010) (Mohanty, 2010) in India. The Reserve Bank of India has also argued that the supply side shocks have been main drivers of inflation in India (Reserve Bank of India, 2010). A commodity wise analysis of inflation by Nair and Eapen (2012) has found that majority of commodities was subject to inflationary pressures due to domestic supply side constraints.

3.2.3 Other Factors

The other factors responsible for this high food inflation may be an escalation in the costs of producing food, the rapid increase in farm input prices and long-term structural deficiencies such as low productivity, fragmented landholdings, and declining public investments in agricultural infrastructure (CAP 2012; Dev 2009). Increasing demand for biofuels, and needs of increasing population (World Bank 2008), climatic factors are also responsible for the same. High population growth and increase in income are also adding the same. The input costs have a significant and poignant role in the escalation of food price inflation. It is evident that with the exception of agricultural machinery and related inputs, the prices of other inputs measured by the WPI inflation rate were subject to significant increase in recent years. On an average, the WPI inflation rate for fodder recorded an increase of 19.64% between December 2009 and August 2013 followed by diesel oil (19.01%), electricity for agricultural purposes (12.66%), high speed diesel (12.43%), lubricant (10.04%), fertilizers (9.74%) and oil cakes (9.67%). Significantly, these figures are higher than average headline inflation of 8.17% in the same period. As for the cost, a key element of farm input cost, (estimates show that more than 40% of total variables cost of production in Indian agriculture consists of labor (GOI 2012) the agriculture labour wage rate (in nominal terms grew at an average annual rate of 20% (CAP 2013) between 2009 and 2012 (January- December). Agricultural wages increased

substantially in real terms as well. Between 2005 and 2011, the real wages of agriculture labour in rural India grew at a rate of 2.67% and 3.67% for men and women respectively, compared to 0.10% and -0.05% for men and women respectively from 2000 to 2006 (Dreze and Sen 2013). The former trends make the food articles and also the food products costlier and the additional fuel is supplied by a later increase in (agricultural) wage rates. These increases in wage rates along with the implementation of various programs and policies in last few years under the slogan of inclusive growth have enhanced and fostered the income level (especially of rural masses) very high. It is evident that the Mahatma Gandhi National Rural Employment Guarantee Act (MGNERGA) scheme, guaranteeing at least 100 days of wage employment per household, has perked up the rural wages. The indexation of wage rate to Consumer Price Index for Agricultural Labourers (CPI-AL) since 2011 has contributed to the wage-price inflation spiral. Nominal wages of workers increased much faster than CPI-AL inflation in most of the states thus resulted in pushing up the real wages. Expenditure in wages under MGNERGA rose from Rs 5,800 crore in 2006-07 to Rs 18,300 crore in 2012-13. Thus the success of MGNERGA has not only affected labour cost, but it has also tightened the availability of agricultural labour during peak seasons. India's agriculture is labour intensive, and sustained wage pressure can keep food price inflation high even in the years of recorded production as was the case in 2010-11.

3.3 Data and Methodology

In this section, we will formulate the framework for analysing various determinants which could potentially affect the food prices in India. Note that the variables that are thought of central importance in influencing the Indian food prices are selected for inclusion in the model. Although we do not make an attempt to build a fully structural model of food price determination, but the economic theory guides us for the selection of explanatory variables. One important point here is worth to mention that the focus is to check the validity of the policy instruments used by the commanding agencies of the economy to check the food inflation. [1] The variables

[1] As in case of Indian economy the issue of prices is always associated mainly with monetary policy monetary

that are being taken into account are food prices[2] (2004-05=100), money supply, input cost index[3] (2004-05=100), world food price, (2002-04=100), and real effective exchange rate (2004-05=100). All the data except world food price index has been collected from RBI. The data for world food price index has been collected from Food and Agricultural Organization (FAO). The Granger casualty test procedure as proposed by Toda and Yama (1995) has been used as a methodological tool.

The Toda and Yama (1995) method of Granger casualty test are relatively more efficient and are particularly appropriate for the time series for which the order of integration is not known or may not be necessarily the same, or the order of integration is more than two. The test has one more advantage, that it does not require pretesting of the time series for co-integration properties so long as the order of integration of the process does not exceed the true lag length of the model (Mishra, 2014). Toda and Yamamoto (1995) methodology of causality test by directly performing the test on the coefficients of the VAR, minimises the risk associated with possibly wrong identifying the orders of integration of the series and the presence of co-integration relationship(Galies, 1997; Mavrotas and Kelly,2001).

The basic idea in the Toda Yamamoto (1995) procedure is artificially augmenting the correct VAR order, with *k* with *d* extra lags, where *d* is the maximum likely order of integration in the empirical system. Thus at the outset, it is required to determine the maximum order of integration of the time series, say, $d_{max.}$ Then the optimal lag length of VAR is to be determined using the lag length criterion (Akaike Information Criteria (AIC)), say, *k.* In the next step, the $(p= k+d_{max})^{th}$ order of VAR is to be estimated with Seemingly Unrelated Regression (SUR). In the final step, the null hypothesis of no-causality is to be tested using a standard Wald statistics, say, *W.*

The implementation of the Toda and Yamamoto approach to Granger causality linking the variables of the study as following:

[2] Food prices wherever we have used or going to use means World food price, whole sale price index of food (2004-05=100)

[3]The Index of agricultural input costs was constructed from WPI. The components taken are akin to CACP's agricultural inputs, namely, fertilizer and pesticides, electricity, high speed diesel, light diesel, lubricants, fodder, cattle feed, tractors, and agricultural machinery and equipment's. For this purpose, the weights of the respective components in WPI were normalised to 100 and the price indices aggregated using the new weights for arriving at the composite input cost index

$$fp_t = \emptyset + \sum_{i=1}^{k} \alpha_i f_{t-i} + \sum_{i=k+1}^{k+\rho_{max}} \alpha_i f_{t-i} + \sum_{i=1}^{k} \beta_i ms_{t-i} + \sum_{i=k+1}^{k+p_{max}} \beta_i\, ms_{t-i} + \sum_{i=1}^{k} \gamma ici_{t-1} + \sum_{i=k+1}^{k+p_{max}} \gamma_i\, ici_{t-i} + \sum_{i=1}^{k} \delta_i wfp_{t-i} + \sum_{i=k+1}^{k+p_{max}} \delta_i wfp_{t-i} + \sum_{i=1}^{k} \theta_i er_{t-i} + \sum_{i=k+1}^{k+p_{max}} \theta_i er_{t-i} + \epsilon_t$$

Where, fp_t is Food Inflation, ms_t is Money Supply, ici is Input Cost Index Exchange Rate, wfp_t is World Food Inflation, er_t is Real Effective,α_i , β_i, γ_i, δ_i , θ_i are the models parameters, p_{max} is the maximum order of integration accepted to occur $\epsilon_t \sim N(0, \ _{\epsilon})$ is the residual of model. By following the above mentioned VAR model, null hypothesis (H_o) of causality from the abovementioned variables to the food prices are tested using the Wald test were then applied to first k coefficients matrices using the standard χ^2 statistics (Duasa,2007).

3.4 Empirical Results

As we discussed in the methodology before going directly into the testing of causality the unit root and the model selection, it is necessary to select the d_{max} and K respectively. We employ the benchmark Augmented Dickey-Fuller (ADF) test (1979) to check the order of integration of the data series under consideration. The table 3.3 reveals that all the variables are non-stationary at the level because the t-statistics of ADF test for all the variables are statistically insignificant. However, the variables are stationary at their first differences; hence with stationarity at first difference, these variables are integrated of order I (1).

Table 3.3: Augmented Dickey-Fuller (ADF) Test for Unit Root

	Augmented Dicky Fuller Test(ADF)	
Variables	**At Level**	**First Difference**
FP	-2.263126 (0.185)	-7.994182* (0)
MS	-1.739489 (0.4101)	-6.091143* (0)
ER	-1.743405 (0.4057)	-5.098126* (0)
ICI	-2.366187 (0.1546)	-5.164795* (0)
WFP	-2.573187 0.1513	-8.363304* (0)

* represents the significant level at 1%.

Table 3.4: VAR Lag Order Selection Criteria

Lag	Log L	LR	FPE	AIC	SC
0	-3837.202	NA	32738760	31.49346	31.56512
1	-2719.046	2181.319	4204.163	22.53317	22.96315*
2	-2679.664	75.21307	3737.611	22.41528	23.20358
3	-2653.882	48.18263	3716.097*	22.40887*	23.55548
4	-2631.292	41.29178	3794.753	22.42863	23.93355
5	-2609.821	38.36596	3913.659	22.45755	24.32080
6	-2596.528	23.20883	4320.069	22.55351	24.77507
7	-2558.046	65.60863*	3883.389	22.44300	25.02288
8	-2539.347	31.11472	4110.695	22.49464	25.43284

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

The optimal lag length criterion for the model selection has been used. The criterion like Sequential modified likelihood ratio (LR), Final prediction error (FPE), Aikaikie information criterion (AIK), Schwartz information criterion(SIC) and Hanan Quinn information criterion (HQ) suggested optimal lag length. The entire criterion

has the logical footing for their optimal lag selection. As discussed above we used the AIC shows 3 as the optimal lag length for the same has been selected by the FPE criterion, as on double checking we have chosen 3 as optimal lag length. The results are depicted in table 3.4

We also check the co-integration of the variables. However, this is not it is not necessary to conduct the test of cointegration when we are running the Toda Yamamoto (1995) for the checking the causality, but this will help us in double checking. Now, since the variables are of the same order of integration I (1), so we use Johansen Co-integration to find the cointegration between the variables. The results shown in table 3.5 are of Johansen Co-integration test. The test reveals both the Trace Statistics--- and Maximum Eigen Statistics ----- indicates the cointegration and a number of cointegrating vectors.

Table 3.5: Unrestricted Cointegration Rank Test (Trace)

H_0	H_1	Trace Statistic	0.05 Critical Value	Prob.**
r≤0*	r≥1	113.1367	69.81889	0.0000
r≤1*	r≥2	66.25719	47.85613	0.0004
r≤2*	r≥3	36.77061	29.79707	0.0067
r≤3	r≥4	18.94992	21.13162	0.0983

*Denotes rejection of null hypothesis at 5% level of significance
**MacKinnon-Haug-Michelis (1999) p-values

Table 3.6: Unrestricted Cointegration Rank Test (Maximum Eigen Value)

H_0	H_1	Trace Statistic	0.05 Critical Value	Prob.**
r≥0*	r≥1	46.87951	33.87687	0.0008
r≤1*	r≥2	29.48658	27.58434	0.0282
r≤2*	r≥3	17.82069	15.49471	0.0219
r≤3	r≥4	12.47271	14.26460	0.0941

*Denotes rejection of null hypothesis at 5% level of significance
**MacKinnon-Haug-Michelis (1999) p-values

Both the statistics confirm the existence of co-existence of co-integration and same number of cointegrating vectors. The trace statistics is 113.14which is greater than the critical value of 69.82 at 5% level of significance. Therefore null hypothesis

of r≤0 is rejected against the alternative hypothesis. The same is r≤1 and r≤2 with the same logic of Trace statistics greater than the critical value at 5% of the level of significance. Hence indicates three cointegrating equations and confirms the existences of relations among the variables. The same number of cointegrating equations has been confirmed by the Maximum Eigen Statistics.

Having ascertained that co-integrating relationships exist among the variables then, we can finally study or estimate, does the variables other than food prices are the factors causing food inflation. The test is being done using Toda Yamamoto (1995) test. The Toda-Yamamoto (1995) test, as mentioned earlier is estimated through MWALD test as reported in table 3.7

Table 3.7: Toda-Yamamoto Causality (modified WALD) Test Result

Variables	Chi-sq	Df	Prob.
ER	13.19101	3	0.0042
ICI	8.067190	3	0.0446
MS	2.747544	3	0.4322
WFP	2.784900	3	0.4260
All	27.26340	12	0.0071

The MWALD test results follow chi-square distribution with 3 degrees of freedom in accordance with an appropriate lag length along with their associated probabilities. From the table, it is clear that the exchange rate and input cost index are significant while as the world food price, the money supply has insignificant.

3.5 Conclusion

Food price inflation is one of the most critical economic problems not only at the national level at the international level too and the ability to control prices of food articles quickly and effectively is one of the main bases on which people will judge the performance of the Government. In the Indian context, it has become increasingly persistent in recent years. Any shock will have a much longer impact on inflation, as there is a close association between the food prices and general price level, especially in the post-reform period. Furthermore, food inflation is comprised

of many components, and in the post-reform period, it has been found that there has been a dramatic shift in the compositional pattern of food inflation index. As from the analysis it has been found that this shift has occurred in the form of protein-rich components which have contributed a lot in the food inflation despite having low share in the index, e.g. as revealed in the table 3.3 the share of egg, meat and fish is 16.84% in the WPI food price index whole as the share of the same commodities in the food inflation is 27.60% in the whole post-reform period. On the other hand, food grains having a share of 28.53% are contributing only 23.24% in the food inflation. Finally, we estimated the determinants of the food inflation in the post-reform period. From the analysis, the interesting conclusion that has been drawn is the input cost index (ICI), and the exchange rate (ER) are having significant causality while as the money supply is of having insignificant. The insignificance of the money supply has significant policy implications. As in Indian context, it is the monetary policy and ultimately money supply which is mainly time and again used to control the inflation in general and so food inflation[4]. But this insignificance is an alarm for the policy makers to think otherwise and have to change their methodology in framing their policies especially with reference to control the food inflation in particular. As the significance of supply side factor especially the input cost index and the insignificance of the demand side factor i.e. money supply there is a need to relook into the policy framing. It is need of the hour to maintain the balance between the supply side and demand side factors. Not only this, but policy makers also have to take into account the compositional pattern of the food price index, as there is a dramatic shift in the compositional pattern of food price index, so that make the policies a grand success.

[4] This is because of the fact, as discussed in the introductory part of this chapter as there is close association between the inflation and food inflation.

CHAPTER 4

Fuel Price Dynamics in India

The link between the economic growth and energy is inextricable since long ago and is considered as the main ingredient for the economic growth. Crude oil is a major source of fossil fuel energy and is currently considered one of the major sources of energy in the world. Nowadays, crude oil is globally deemed as an important and strategic source, which is of prime importance for both importing and exporting countries (He et al., 2010). Among the energy sources petroleum comprising crude oil and refined products has become one of the very significant contributors to the economic growth not only in the present era but it has its roots much earlier especially since the process of industrialisation was its budding stage. India was the fourth largest consumer of oil and petroleum products after the United States China and Japan in 2013, and it was also the fourth net importer of crude oil and petroleum products, imports more than 80 percent of its crude oil requirements. The gap between India's oil demand and supply is widening, as demand reached nearly3.7 million barrels per day (bbl/d) in 2013 compared to less than 1 million bbl/d of total liquids production. EIA projects India's demand will be more than double to 8.2 million bbl/d by 2040, while domestic production will remain little flat, hovering around 1 million bbl/d.(EIA 2014)). And it may be expected that the demand will continue to climb as a result of the country's dynamic economic growth and modernization over the past several years. As it has a monopoly of having importance in the world's energy demand, no doubt there are also alternative forms of energy such as the wind, water, solar as well as nuclear but due to inadequate supply and absence of technology to tap their potential and high costs have empowered the dominance of crude oil as a main source of energy. Due to this dominance in the energy sector, there must arise a close coordination between the crude oil (production, prices, etc.) with other macroeconomic variables. And when the economy is the net importer of the crude oil, (as well as the price taker in the world market) the effects may be very much challenging not only for the policy makers but the academician's and the researchers as well, due to its exogenous nature.

International crude oil prices are experiencing tremendous volatility and also a sharp rise in the prices over the past few years. However, there has been a dramatic decline in the international crude oil prices from last few months[1]. But one important point to note here is that India being an importing country and hence price taker in the international oil market has repercussions on its macroeconomic variables in general and the price fluctuations in particular. With the decline in international oil prices, with a positive impact on Indian economy, there is cheer in the political as well as in the public domain. However, we should be concerned regarding the volatile nature of oil price and hence uncertainty of oil prices rather than a steep increase or decrease in the oil prices from a policy point of view. The crude oil prices in the world market which were only $13.8[2] per barrel (bbl) in February 1994 and reached a peak of around $132.7 per barrel in July 2008. After August 2008 however, the crude oil prices started declining but not up to the mark as they were still above $101/bbl in August 2014. With this dynamic volatility and a sharp rise in prices crude oil, all oil importing countries like India are facing a spectre. As this rise in the prices of crude oil gets passed on the petroleum products, there does arise dichotomous effects or acts as a double edge sword. From a consumer's standpoint, the energy bill of the economic agents (household, industry, and government) grows, whereas from the production standpoint, companies have to contend with a rise in unit cost. In terms of demand, this slows down this consumption expenditure. In terms of supply of goods and services a rise in energy prices causes a drop in productivity, which is passed on the real wages and employment, selling prices and core inflation, profits and investment as well as stock market capitalisation.(Bhattacharya,Batra2009). That is to say, these petroleum products have a close link and association with major macroeconomic variables and rise in the prices of these products will definitely have an impact on the general prices level of the economy as a whole. In short, these oil price hikes lead to cost-push inflation that leads to fall in output and shift in terms of trade. However, the impact of these hikes would be more in the case of developing countries than developed ones because of lack of oil conservation techniques and

[1] The decline the international oil prices due to many reasons ranging from declining demand and n US shale production is not the point of debate here.

[2] The representative international crude oil price used for the analysis is Brent as it has high correlation with the other benchmark international crude oil prices as also with the prices of Indian basket. However the composition of crude Indian basket represents average of Oman and Dubai for sour grades and Brent for sweet grade in the ratio of 59.2:40.2

absence of appropriate oil substituting techniques in the production process. In this context, Indian economy may not be an exception.

There is substantial literature on macroeconomic nature and impact of oil prices on both the importing as well as on the exporting nations. Internationally although there is the general consensus regarding the inflationary and reactionary oil prices (Darby 1982), the studies revealed the impact of crude oil prices on economic activities. Theoretically, most of these research studies have concluded that the oil price shocks lead to substantial increase in wages and prices and a decrease in real output (Burno 1982, Brun and Sachs 1982). Cristini (1999) observed a strong correlation between the macroeconomic activities and these prices. An IMF study reveals that for industrial countries as a whole a US $5 per barrel increase in oil prices reduces GDP by 0.3 percentage points and lead to an increase in inflation in the short run. The same study reveals that the impact on developing countries varies widely across countries (IMF, 2000). The study indicates in Indian context that a sustained US $5 per barrel increase in the price of oil leads to 1.3 percentage point increase in inflation after a year and reduces the annual GDP growth by 0.1 percentage points. The increase in oil price may not only affect the macroeconomic variables but also have an impact on consumer expenditure too[3] . These higher prices lead to a reduction in discretionary income, with the increase in energy bills. Also, the fluctuating energy (oil) prices create uncertainty about the feature path of prices of energy consumption (Bernamke, 1983). Another most important cause of concern related to the way of the channels through which the oil price affects the macroeconomic scenario of the economy may be described as price channel, import channel and the fiscal channel((N R Bhanumurthy, 2012). As is clearly evident from last few years, given the preponderance of oil imports in the import basket and the growing energy demand an increase in oil prices have an impact in the form of worsening terms of trade. Moreover, another important point to note here is that the deregulation of oil prices (as the policy regime now a day is moving ahead) will lead to a direct as well as an indirect increase in general price level, on account of the direct use of oil and as a cost of production. RBI (2011) has estimated that every 10 percent increase in global crude oil price if fully passed through to domestic prices, could have a direct impact of 1percentage increase in the wholesale price index of inflation and the total

[3] See Edelstein and Killian, 2009

impact could be almost 2 percentage points. Same is the case when there is the huge pressure of subsidies for which government had time and again argued which lead to increase in revenue deficit and hence fiscal deficit is another danger of the economy. And finally, the import channel which leads to an increase in the current account deficit and has its impact on the nominal GDP and hence disturbs the health of the economy.

The enormous number of studies analysed the different aspects of the oil prices and their impact on the different macroeconomic variables. But the most important aspects lacking these studies in general and in the Indian context, in particular, are: the nature of these products and compositional (import/ export, production/consumption) aspect of the pricing policy, nature of increasing dependence like issues are then need of the hour to analyse in detail. Based on the fiscal, trade and the stability aspect the study makes an attempt to analyse all these issues.

The analysis is undertaken using the monthly data for the period (April1991 to November 2014). The has been collected from various sources including, *Handbook of Statistics on Indian economy and monthly bulletins(*various issues) , of Reserve Bank of India; *BP Statistical Review*, www.ppac.org.in and Basic Statistics of Ministry of Petroleum and Natural Gas, Government of India.

4.1 Pricing Mechanism of Petroleum Products

The pricing of the crude and petroleum products in the country has been influenced by a multiplicity of politico-economic factors and interests of various actor and interest groups involved in the matrix, such as consumer particularly in the vulnerable sections, the producers, refiners, and marketing companies and above the government. India being the net oil importer, hike as in international oil prices and the consequent escalation of import bill has its impact on the overall health of the economy. Keeping in view the import dependence nature of the Indian economy, the oil sector industry has followed times, and again the pricing policy changes for the petroleum products. The pricing policy of the fuel pricing goes back early sixties. The first such committee headed by K.R.Damle (1961). The committee examined the issue of foreign exchange conservation, particularly as the refining and product imports

were in the hands of the foreign oil companies and proposed incentives for the oil companies to increase gross profits by lowering their operating and other costs. It also recommended for the reduction of discounts from free-on-board (FOB) prices. The committee recommendations were valid only till March 1965. Another committee under the chairmanship of the T.N. Talukdar, however, worked for a short period, extended the concept laid down by the Dmale committee. The committee recommended that the prices were to be based on the principle of import parity with the fixed formula of build-up up to the carriage, insurance and freight (CIF). The price formula was firm and had twin advantages of being reasonable and encouraged the oil companies to enhance their profitability by lowering costs. The recommendations were in action till December1965 were government appointed the new committee under the chairmanship of the Shantilal Shah. The committee was required to determine the landed cost of imported petroleum products, feasibly of making of all refineries, including inland refineries, as pricing points, marketing and distribution charges, and profit and on distribution and marketing operations product wise and determination of dealer commissions for petrol, high speed diesel, superior kerosene and light diesel oil. The recommendations were implemented for a period of three years from June 1970. Under the chairmanship of S. Krishnaswamy, the government of India constituted the oil price committee (OPC) in March 1974. The committee recommended the discontinuation of the 'import parity' principle and instead suggested the Administered Price Mechanism (APM) for the pricing of petroleum products. The APM came into existence on December 16, 1977, based on the recommendations of the committee.

Notwithstanding the rising level of oil imports, hikes in international oil prices and the consequent impact on import bill, India has continued to follow APM. The major twin objective of the APM model was to ensure stable prices and safeguard the domestic market from the international price volatility. In due course, however, it was realised that due to increasing import pressures, to sustain/accelerate the domestic exploration and production there is an essential need to free the public sector oil producers from the government control for future oil security. Accordingly started from 1997, the APM was fully dismantled in April 2002. However, using the myth of subsidisation and fiscal burden, capitalist's interest, have long been pushing for liberalisation and the process started in 1997 and in April 2002 the crucial victory of

dismantling came to full power. Under the new pricing environment, the price of indigenous crude was to be market determined, and prices of all petroleum products were based on import parity price. The consumer prices of all petroleum products barring domestic LPG and PDSSKO were to be made market determined. Moreover flat domestic subsidies would be given to domestic LPG and PDS SKO. However, post-APM product pricing regime beginning in 2002 was adhered to only a very briefly by the central government and OMCs. The post-APM model had been effectively abandoned with the once again centrally sanctioned upward price revisions had been announced by the central Government. This abandonment of post-APM came along with the same line of protecting the Indian consumers from the sustained rise in crude prices beginning in 2004. The repercussions were a significant increase in the under-recoveries[4] of oil marketing companies. The government of India began burden sharing mechanism by which under-recoveries were compensated partly by the government through the issues of bonds or cash assistance and partly through PSU upstream companies[5] through price discounts on crude oil and petroleum products. The OMCs were also expected to absorb part of the burden. The unsustainable level of under-recoveries led to a revision of policy. In 2005, the government set up a new committee under the chairmanship of Rangarajan to study the pricing and taxation of petroleum products. This committee recommended a half-way house: a ceiling on the refinery gate house computed according to so-called trade parity formula, which would be weighted average of import parity and export parity in the ratio of 80:20, along with freedom with oil market companies (OMC, s) to set the retail price. However, PDS SK and domestic LPG would continue to be priced based on import parity. Committee also recommended in the reduction in effective protection to refineries by lowering customs duty to 7.5%, restructuring of excise duty and an increase in oil industry development board (OIDB) cess to reduce under-recoveries.

Finally, the government constituted the next committee under the chairmanship of Karit Parik (2009), submitted its final report in February 2010. Moving ahead the agenda of deregulation of oil sector the Parik Committee have hinged their argument on the issues of Under-recoveries and hence huge losses of

[4] These are the difference between the actual price realised and a notional price

[5] These include Oil and Natural Gas Corporation(ONGC), Oil India Limited (OIL), GAIL

Public sector oil marketing companies. Despite of many reasons[6] but mainly they were of the, that when the domestic prices of oil products are controlled, but the prices of imported crude oil are rising, so the oil marketing companies receive from consumers less than what it costs them to acquire the products they distribute, leads to losses or what they have termed as under-recoveries for oil marketing companies. Hence recommended the deregulation of one of the critical sector of the economy.

4.2 Price Building Mechanism of Petroleum Products

Heavily oil importing countries like India would naturally have the effect of the vulnerability of international oil prices (crude oil) particularly on its domestic oil prices and the general price level as well. But as in the case of the Indian economy, the policy regarding the oil sector was fully administered and was under the full control of the government of India to protect the consumers from international price hikes even after opening the economy in 1991. However the process of the deregulation started in 1997, and the AP model was fully dismantled in April 2002. However, the new deregulation process started from June 2010 based on the Parikh committee (2010) recommendations. In this backdrop, it is interesting to know the process of price setting for the petroleum products[7] in India.

The price building process for petroleum products in India is quite interesting, for that let us consider the case of National capital rates for petrol as was effective on 2nd January 2015. The Cost and Freight (C&F) price were US$ 67.06/bbl. and the exchange rate was RS 63.26, US$- that makes refinery transfer price (RTP) on landed cost basis i.e. price paid by the OMCs to refineries in terms of Indian Currency Rs. 27.25/Litre. But the price (excluding excise duty and value Added Tax (VAT) charged to the dealers was Rs. 33.73/Litre and the difference were under-recovery. Adding Rs. 15.40/Litre specific duty with 3% education cess, dealers commission of Rs. 2.03/Litre and Rs. 10.23/litre VAT (@20%) the retail selling price in Delhi comes to be Rs. 61.39/ litre. But the most important point here to note is that 41.75% of retail price of petrol is attributable to excise duty and VAT. Same the story in the case of diesel, kerosene, and LPG, however in the rest of the three commodities the Under-

[6] For details see Parik, kirit S et al. (2010)

[7] However we are only in interested four petroleum products, i.e. petrol, diesel, kerosene and LPG

recoveries and subsidies are being included. The whole price building process is as follows.

Table 4.1: Delhi Rates for Petrol, Diesel, kerosene & LPG on 1st January 2015[8]

Category	Petrol	Diesel	Kerosene	LPG Per Cylinder
RTP price	Rs.27.25/litre	Rs. 48.35/Litre	RS. 31.67/Litre	Rs. 538.18
Desired Price[9]	Rs.27.25/litre	Rs. 50.56/Litre	Rs. 33.83/Litre	Rs. 631.90
Less under-Recovery+ Subsidy	-	Rs.17.05/Litre	Rs. 20.28/Litre	Rs. 257.78
Price Charged to dealer	Rs.33.73/Litre	Rs 33.51/Litre	Rs 13.55	Rs.373.42
Taxes	Rs.25.63/litre	Rs.13/litre	Rs. 1.59/litre	Nill
Taxes a % of Final Price	41.75%	20%	10.50%	0%
Dealers Commission	Rs.2.03/Litre	Rs. 0.90/Litre	----[10]	Rs.44.06
Retail Selling Price	61.39	Rs.41.32/Litre	Rs.15.14/Litre	Rs.417.00

Source: Petroleum Planning and Analysis Cell, Ministry of Petroleum and natural GAS, GOI

4.3 Compositional Scenario

The compositional nature of the petroleum industry in India has shown a range of disparities and diversions in the sample periods. As the process of economic development and industrialisation on its way, so its demand for energy goods (POL) had definitely gone increase. But due to production stagnation, there are only two

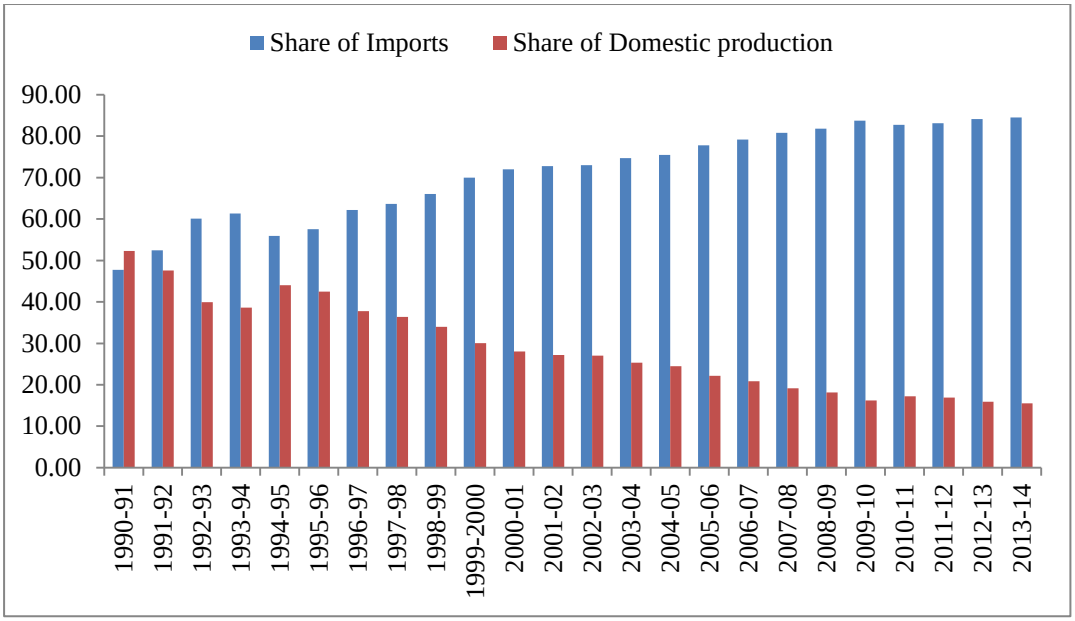
[8] However for the diesel it is taken as proxy of 1st September 2012, because the new price building has not been updated, because of policy changes i.e. is full deregulation of diesel as well.

[9] Desired Price = Summation of inland Fright and delivery Charges + State Specific Costs+ Marketing costs of OMCs +Marketing Margins of OMCs

[10]Commission fixed for Wholesale & Retail Dealer and other charges like delivery charges by District authorities / State Government.

alternatives in hand for Indian economy either to have import dependence or to choose alternative sources of energy. However, the Indian economy chooses the former one, due to many reasons. This dynamic and drastic change in the industry is evident in production, composition, imports as well as in exports. As India is the net importer of oil imports and the dependence on the oil imports is continuously rising from 29.36 million tonnes in 1990-91 to 205.96 million tonnes in 2013-14 while as the domestic production of crude oil production is somehow stagnant in the sample period and was 32.16 million tonnes and 37.79 million tonnes respectively. The data for shows that share of domestic contribution was higher than that of import share in the initial reform period[11]. The chart shows that more than 50% consumption demand was fulfilled by the domestic production in the early reform period while as in the current period more than 80% demand is fulfilled by importing the crude oil and petroleum products.

Figure 4.1: Domestic and Import Share among the Total Petrol from 1990-91 to 2013-14

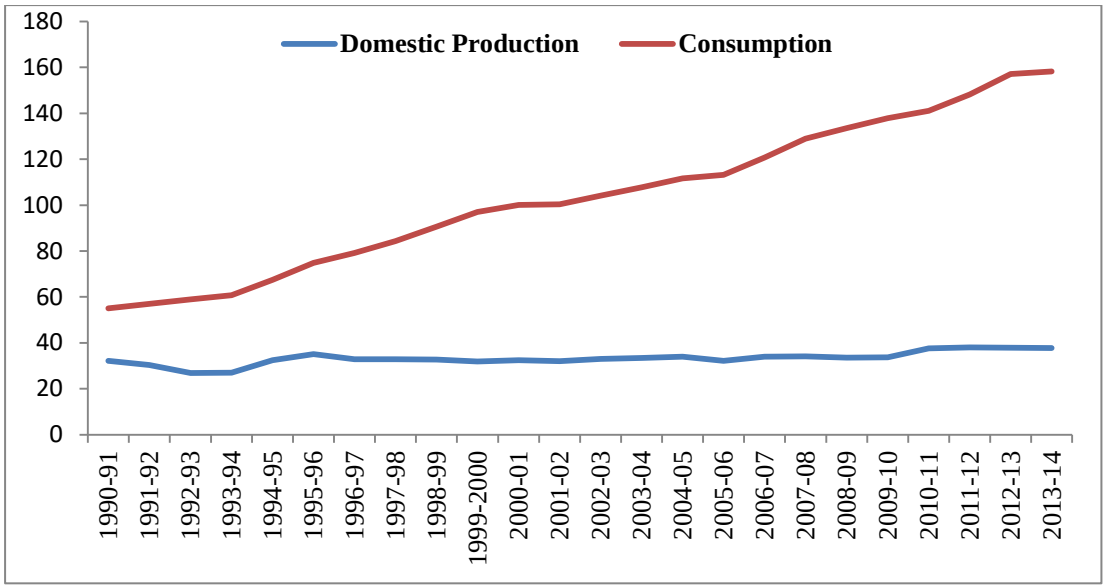


Source: Indian Petroleum and Natural Gas Statistics, various Reports

[11] Note that when we are taking into account the domestic and imports shares we are considering the domestic crude oil production and the import crude oil as well as the petroleum products. And also out of total oil we have, is not only for domestic consumption purposes but also for exporting purposes as well.

As the figure, I show that there has been a tremendous increase in oil imports. Also, it is in place to mention here that in absolute terms the share of domestic production has remained stagnant. Which led to the emergence of the import gap in the post-reform era which is fulfilled by the imports and hence a heavy import dependence. The following graph shows the import gap.

Figure 4.2: Domestic Production and Consumption of Crude Oil and Petroleum Products and (Import Gap) (000MT)



Source: Indian Petroleum and Natural Gas Statistics, various Reports

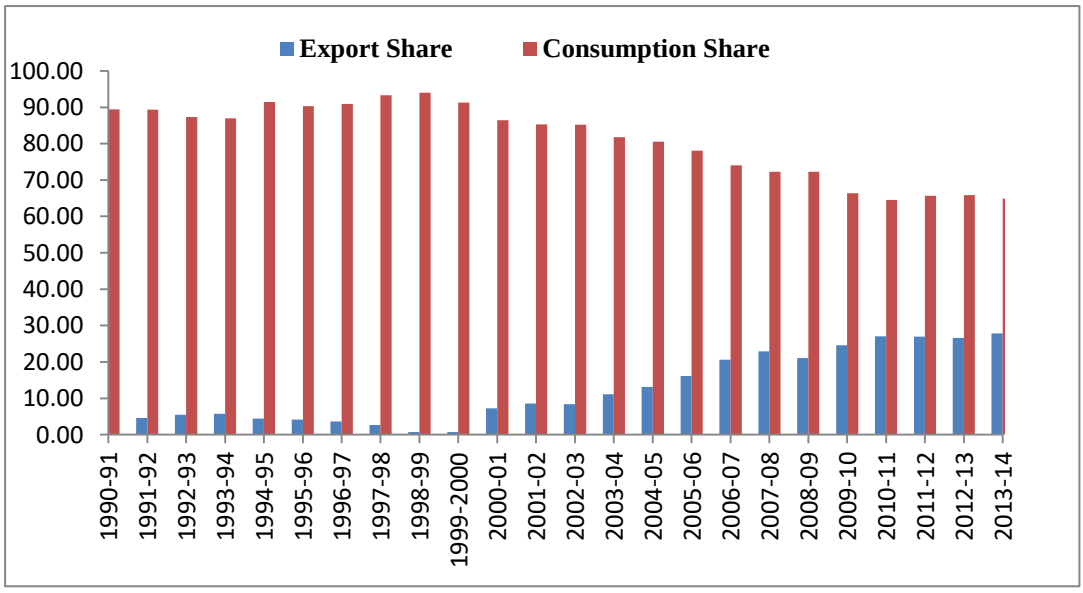
These production and consumption data clearly indicate the escalating mode of oil imports. It is also clear that the domestic production has remained stable in the post-reform despite some new discoveries in Rajasthan. As is evident that at the end of 2012 India had proved reservoirs [12] against the 5.9 billion barrels in 1991(BP Statistical Review 2013). On the other hand, the increasing economic growth is likely to fuel further the demand for oil. In particular, the demand for vehicles is expected to contribute to oil consumption, demand and hence imports, if however the car penetration is still low in India and even a modest increase towards the international level of car ownership could have a huge impact on world oil demand and prices (Bhattacharya, Batra2009). The Energy Information Administration estimate shows

[12] Generally taken to be those quantities that geological engineering information indicates with the reasonable certainty can be recovered in future from the known reservoirs under economic and operating conditions

have the same trends, and the same is clear from the data of consumption estimates of the growing countries in contrast with India.

The pertinent question one may raise here is that why the demand of the oil has increased on a large scale. Does our domestic consumption have increased on such a large scale or we are using these products for other purposes? The simple answer is that either we use these imports for the domestic consumption purpose or for the business purpose. The following chart will make it clear the usage pattern of the petroleum products

Figure 4.3: Export and Consumption Share (percentage terms)



Source: Indian Petroleum and Natural Gas Statistics, various Reports.

The data clearly indicates in the early reform period the petroleum products[13] were mainly demand for the domestic consumption purpose and only a meagre less than 10% of petroleum products were exported. But as the reform process goes ahead the economy opens through the length and breadth, the share of exports started escalating. However, one important indication is that the share of domestic consumption is declining[14] but, on the other hand, this increasing share of petroleum

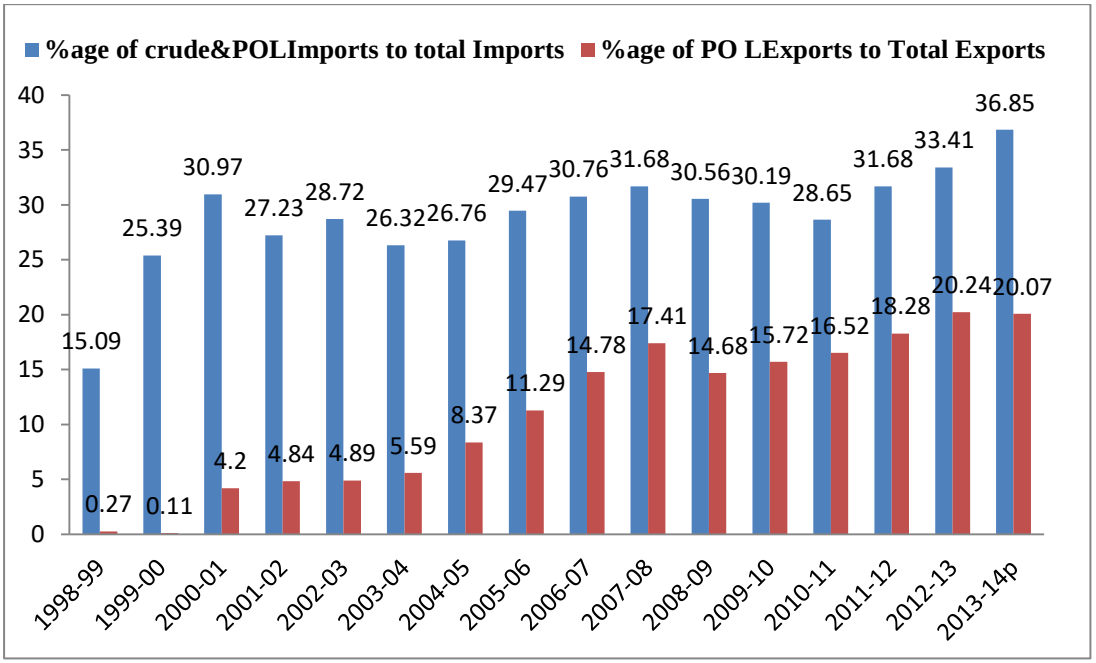
[13] Here it petroleum products because we are only exporting the finished products (petroleum products) not the crude oil

[14] For this see the declining trend of oil intensity in India from the *IFS, World Economic Outlook* and the *BP Statistics*

product exports led to increase the import bill of the economy. This increasing import bill via fiscal and monetary channels has its impact on the macroeconomic variables in general and the price level in particular.

The balance sheet of the oil industry regarding the import and exports in monetary terms indicates that export component is increasing at a high rate than what is happening with the imports of crude and petroleum in the economy. It seems in contradictory that what the government is arguing that the impact of the oil industry on the balance of payments of the economy is very alarming. It is important to note that from the figureV, the share of petroleum product exports which was just .027 percent of total export earnings in 1998-99 reached to 20.07 percent in 2013-14 against the share of crude oil and petroleum product payments in 1998-99 were 15.6 percent of total imports reached 36.8 percent in 2013-14 of total import

Figure 4.4: Share of Exports and Imports of POL to the share of Total share of Exports and Imports



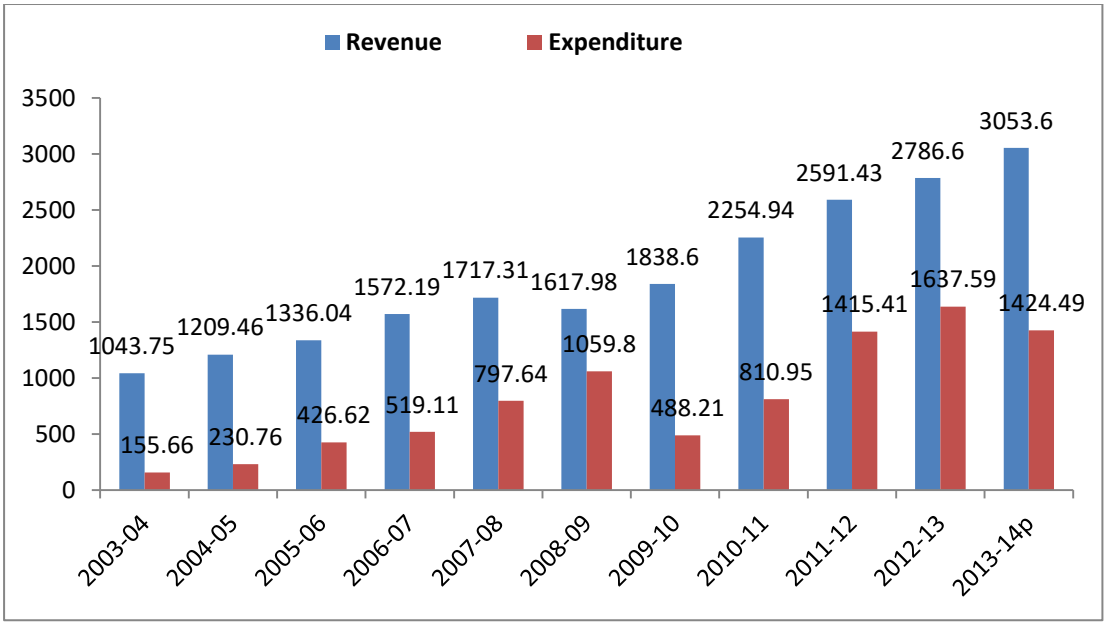
Source: Reserve Bank of India, Hand Book of Statistics on Indian Economy

4.4 Fiscal Scenario

The debate over the petroleum product subsidies/ under-recoveries is always a hot cake in both political as well as non-political arenas of the economy. The huge and cry over these subsidies which lead to high fiscal deficits as claimed by the

government is a major cause of concern for the escalating fiscal deficit. But the pertinent question arises, is really economy in distress due to this subsidy burden or is this sector a huge source of revenue for the government. As already mentioned justifying the government's deregulation policy initiated with the dismantling of APM model, has a basic cause of huge losses to the government. What extend these arguments is relevant and how the nature of these taxes and subsidies has changed over the period of time is our main intuition. As the data clearly indicates the government earns huge revenue from the petroleum (products) sector which is far ahead of its total expenditure on direct as well as indirect subsidies. The data clearly shows the main revenue comes from excise and customs duties followed by sales tax accrued by the central and state governments respectively. The third major share of revenue comes in the form of royalty and oil development cess (ODC), and the fourth one is the dividends paid to the government by the public sector units (PSUs) from their profits.

Figure 4.5: Combined Government Revenue and Expenditure



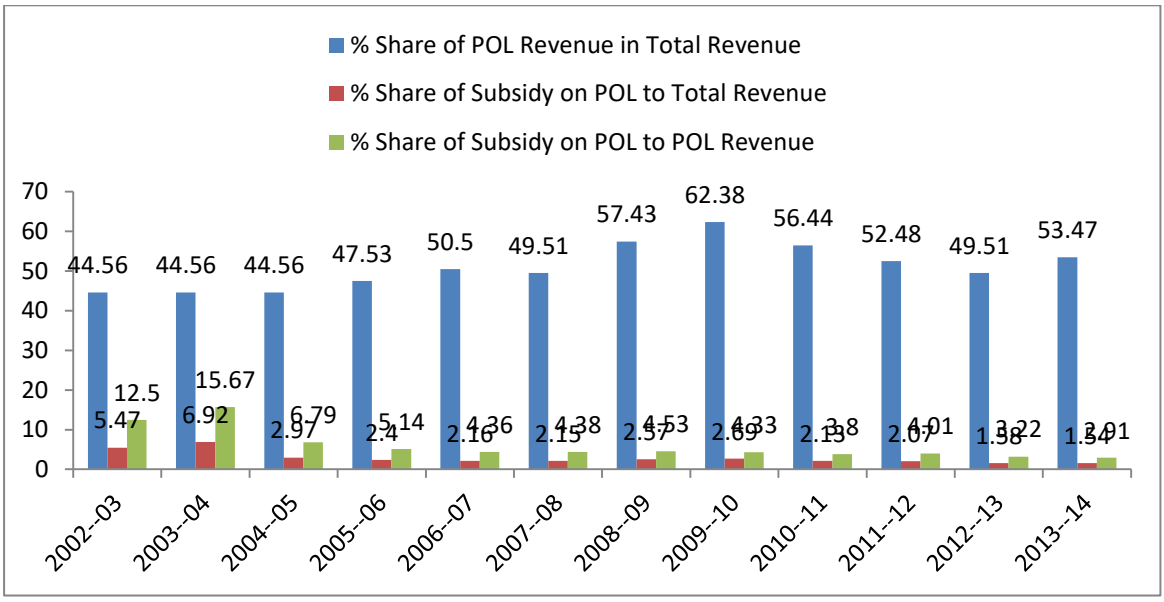
Source: Indian Petroleum and natural Gas Statistics

As the data clearly indicates the government earns huge revenue from the petroleum (products) sector which is far ahead of its total expenditure on direct as well as indirect subsidies. The data clearly shows the main revenue comes from excise and customs duties followed by sales tax accrued by the central and state governments

respectively. The third major share of revenue comes in the form of royalty and oil development cess (ODC), and the fourth one is the dividends paid to the government by the public sector units (PSUs) from their profits. It is important to note that the direct subsidies are minuscule when measured as a percentage of total revenue earning from this sector over the period of time.

The figure 4.6 also clearly rejects the claim time and again argued by the government is that the fuel commodities are surmounting huge costs for the government in the form of subsidies and hence led to increase in the deficits of the government and acts as a fuel for the inflation.

Figure 4.6: Revenue and Subsidy Scenario of Petroleum Products

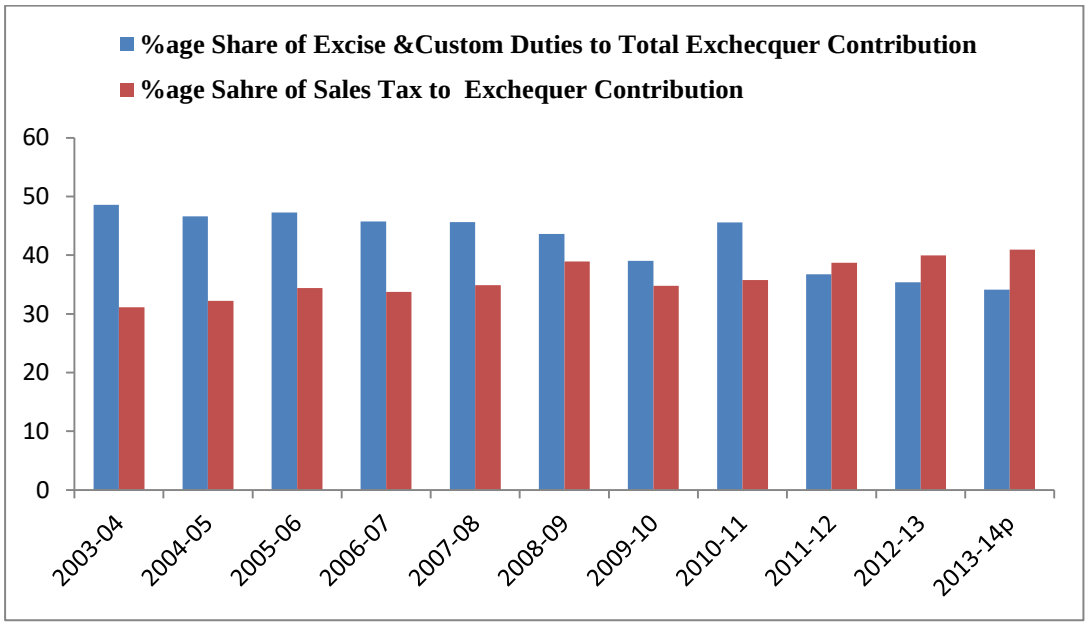


Source: Ministry of Petroleum & Natural Gas, Govt. of India. and Petroleum Planning & Analysis Cell

The figure clearly shows that the burden of subsidies as a share of total revenue of petroleum and non-petroleum products is continuously declining over the period of time. As in 2002-03 the percentage share subsidy to the petroleum product revenues was 12.5% and drastically declined up to 2.91% in 20013-14 and same is the case with the percentage share of petroleum products in total revenue that declined from 5.47% to 1.54% in the same period. However, the share of petroleum product revenue to the total revenue is continuously on an upward trend.

Despite the fact that the Central government reduced the customs duty on imported petrol and diesel from 20 per cent ad valorem to 2.5 percent between June 2004 and June 2008. This is after abolishing customs duties on LPG and kerosene in early 2005. But what is most important and the major portion of imports is crude oil the customs duty hasn't been reduced. Another major cause of concern is the rationalisation of taxes and duties across levels of government are considerably uneven and unbalanced. As the central government has shown a willingness a cut into revenues (if however only meagre i.e. only on imported petroleum products) to help deal with petroleum pricing issues, state governments have been mostly unwilling to undermine this reliable inelastic source of revenue. While the states have almost uniformly moved from an ad-valorem sales taxation structure to a flat-rate structure, they have aimed to ensure that total revenue has been undermined (IEA, 2009)

Figure 4.7: Centre vs. State Taxes



Source: Indian Petroleum and natural Gas Statistics

It is clear from the figure 4.7 that the central government had over the period of time to lessen the burden of the taxes, but the sales taxes of the states is continuously showing a strong positive trend. However the genuine cause of concern is the indirect subsided claimed by the government, but the question arises are these indirect subsidies i.e. under-recoveries are really losses for the government. As several arguments of the Parikh Committee (justifying the deregulation of POL sector) revolve around the issue of rising "under-recoveries". And also, the government

contributing the huge amount to under-recoveries and subsidies, it may seem little unfair to blame the government for hiking end product prices when crude oil is trading high. But there is the need of the hour to analyse that are these claimed under-recoveries really a fiscal burden, or it is simply a concept exploited by the government to justify high fuel product prices.

It is important to understand that under-recoveries are not losses. As a common man perceives the under-recoveries as losses suffered by the oil marking companies, as these are the difference between the actual price realised and a notional price called the import parity, that includes custom duties and still has some elements of the old Administered Price Mechanism (APM) such as freight pooling, ocean loss and other provisions relevant to the actual import of products (Sethi, 2010). This will become more clear if you say for example in the case of petrol, the fixed selling price of petrol is compared to the amount the companies would have paid had they imported the petrol (this will include the international price of petrol, customs duties, transportation costs, marketing cost and margins). However, the price thus arrived has nothing to do with the actual cost of producing the petrol which will be lesser (considering the domestic overcapacity in petroleum products refining markets). But the whole thing is projected make one the accept that the government is making the net losses due to these subsidies and under-recoveries from oil marketing business, so the government set up one after the other committee to deregulate the oil sector.

However, there is no doubt it was a good initiative, for the financial health of the economy and based on the claims by the government and the recommendation of the committee associated with the deregulation policy of the oil sector. However, after the empirical analysis of the sector, it seems that the committees especially the recent one (Parikh committee, 20100) is lacking the major area of taxation. As the sector is a major revenue generator for the government. We must argue based on the empirical evidence that it is not under-recoveries dragging down the viability of oil marketing business but the very twisted taxation and pricing policies formulated by the government. If the government rationalises such taxes (because of which almost 40% increase in the fuel prices) and even if deregulate all fuel products, helps in increasing completion from the private sector will lead to oversupply.

4.5 Implications of Fuel Pricing Reforms in India

The implications of fuel price policy for the stability of macroeconomic variables in general and inflation, in particular, are being analysed by examining the stability aspect of domestic fuel prices and their impact on the general price level. As there is close link between the oil prices and the general price level especially when after the deregulation, so the variation or instability in the domestic prices has an impact on the general price level.

Figure 4.8: Change Point Analyses of Trends in Domestic oil Prices

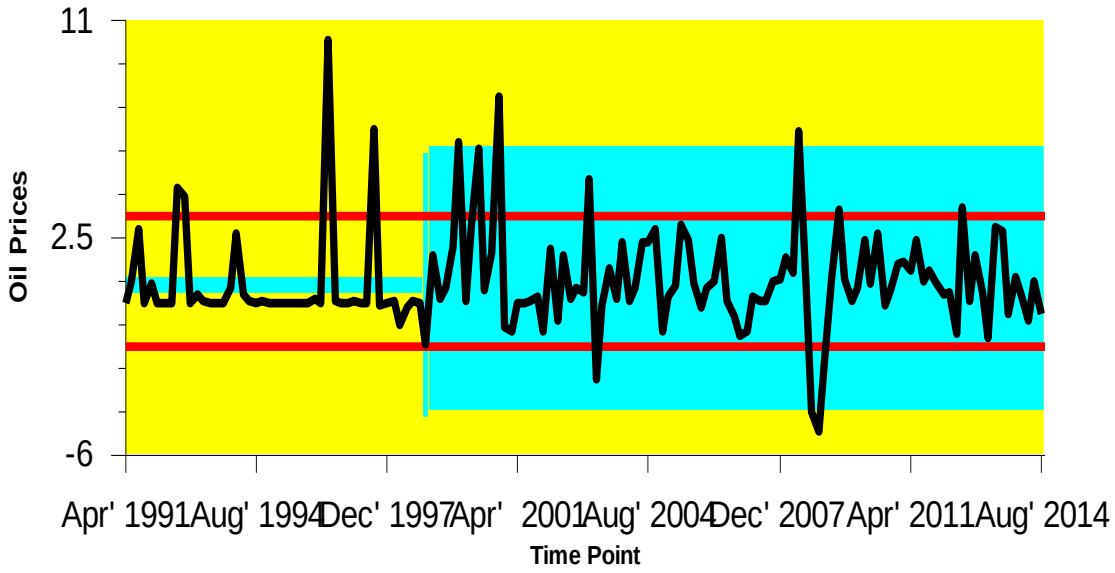


Table of Significant Changes for oilprices

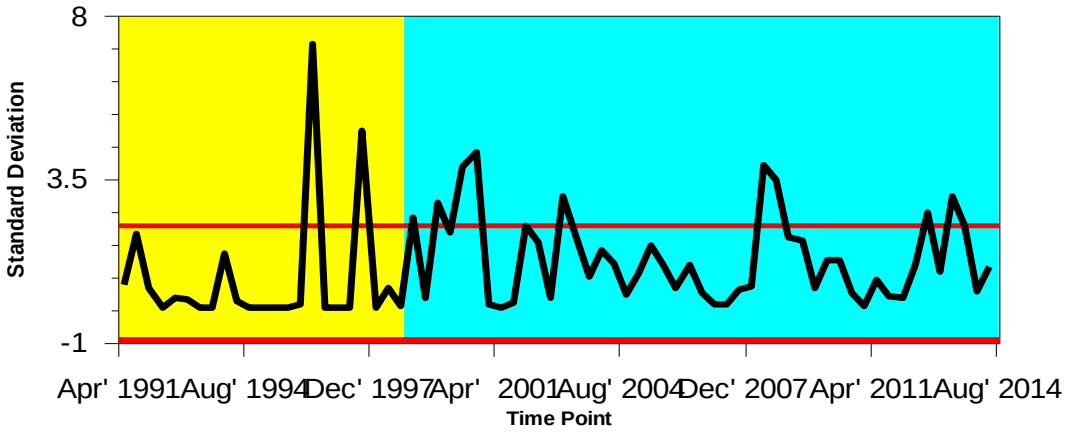
Confidence Level for Candidate Changes = 50%, Confidence Level for Inclusion in Table = 90%, Confidence Interval = 95%, Bootstraps = 1000, Without Replacement, MSE Estimates, Analyze Ranks

Month	Confidence Interval	Conf. Level	From	To	Level
Feb' 1999	(Jun' 1995, Oct' 2008)	95%	0.67872	0.92324	1

After analysing the monthly data, it is clearly evident that there has been a dramatic change in the average monthly price of domestic fuel from February 1999. As the process of dismantling the APM had been started in 1997 and fully dismantled in 2002. In this backdrop, we can say that the impact of dismantling the APM had been started with some lag because it was not the full deregulation but we can say the decontrol of the oil prices. It is after February 1999 the oil prices have been

continuously volatile[15] if however not in the same pattern as the international oil prices. The statistics also shows that the trend has changed in the same period with a confidence level of 96 percent. As the confidence interval ended in October 2008 and following the second dosage of deregulation reforms in 2010 the continuously volatile behaviour of the domestic oil prices shown above. The same story can be concluded by analysing the standard deviation of domestic fuel prices as below.

Figure 4.9: Change Point Analyses Showing the Standard Deviation of Domestic Oil Prices



In this backdrop, we break down our sample period into three sub-sample periods and try to analyse the impact of the changing domestic fuel price policies on the general price level. The three sub-periods are April 1991to February 1999, March 1999 to October 2008 and finally November 2008 to September 2014. As we have used the change -point analyser[16] for examining the dramatic changes in the domestic oil prices and based on the results we have made the demarcation of subsample periods. After detecting the changing points of domestic oil prices, we will make a differential analysis for analysing the impact of this changing nature of oil prices on the general price level. However, for examining the impact over the period, we have used the core inflation in place of headline inflation commonly known as a wholesale price index.

[15] One important point to note here is that the red lines show the control limit and the blue area shows the volatility area of the sample period.

[16] The feature of Change-point Analyzer is that, it detects subtle changes that are often missed in simple trend line plots and also quantifies the volume of change that is not possible in simple trend line plots

The ARDL framework approach has been employed to examine the effect domestic oil prices on the general price level. An ARDL model is a general dynamic specification, which uses the lags of the dependent variable and the lagged and contemporaneous values of independent variables, through which the impact of independent variable can be easily estimated. The ARDL model looks like as follows:

$$\mathbf{Y_{t=}\ \beta_0 + \beta_1 y_{t-1} + ..+ \beta_k y_{t-p} + \alpha_0 x_t + \alpha_1 x_{t-1} + \alpha_2 x_{t-2} + ..+ \alpha_q x_{t-q} + \varepsilon_t} \quad (1)$$

Where ε_t is the random disturbance term, Y_t represents the core inflation and the X_t the domestic fuel prices with respective lags and β_0 as the intercept.

For the three sub-period, we have used the augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1981) unit root tests for checking the stationarity. Then we will run the ARDL model separately for three sub-periods to check the impact of the domestic oil prices on the general price level.

Table 4.2: Augmented Dickey-Fuller (ADF) Unit Root Test (Stationarity Test)

Variables	**ADF Test Statistics**	**Mackinon Test Statistics**	
		1%	**5%**
Y_1(Inflation)	-5.106479	-3.501445	-2.892536
Y_2(Inflation)	-8.740575	-3.488063	-2.886732
Y_3(Inflation)	-5.065413	-3.521579	-2.901217
X_1(oil Prices)	-9.090143	-3.501445	-2.892536
X_2(oil prices)	-8.774546	3.488063	-2.886732
X_3(Oil Prices	-5.158809	-3.521579	-2.901217

Note: Y_1, Y_2, Y_3 the inflation rates of the three sub-periods and X_1, X_2, X_3 the domestic oil prices of the three sub-periods**.**

Table 4.2 reveals the unit root test for the variables under the study of all the three sub-periods; have shown that the null hypothesis of unit root is rejected for the entire variable both at 1 and 5 percent level of significance. Hence, both the variables are stationary at a level in the three sub-periods.

Table 4.3: The Empirical Results for the First Sample Period (April 1991 to February 1999)

Variable	Coefficient	t- Statistics	Prob.
C	**0.226992**	2.684547	0.0087
Y(-1)	**.0624786**	5.966695	0.0000
Y(-2)	**-0.236393**	-1.934994	0.0564
Y(-3)	**0.232880**	2.234614	0.0281
X	0.011754	0.676572	0.5005
X(-1)	-0.020199	-1.156016	0.2510
X(-2)	0.006081	0.341781	0.7334
X(-3)	-0.033987	-1.916935	0.0586

R-Squared= 0.381669**, Durbin-Watson Stat. =** 1.896201**, Prob (F-statistic)=** 0.000001

The results of the first sub-sample period were the period shows that the domestic oil price has an impact on the general price level after a lag of three periods, but the important thing to note is that the impact is negative. It is because in the early reform period the economy was in deep BOP crises and the inflation was also high, but the domestic oil price was completed regulated there were only meagre changes in the oil prices at domestic level, but the general prices were continuously declining. That is why the impacts negative in the period.

Table 4.4: The Empirical Results for the 2nd Sample Period (May 1999 to October 2008)

Variable	Coefficient	t- Statistics	Prob.
C	0.226920	3.233023	0.0016
Y(-1)	0.202313	2.141520	0.0345
Y(-2)	-0.030339	-0.316799	0.7520
Y(-3)	0.181839	1.925176	0.0569
X	0.025362	1.623534	0.1075
X(-1)	-0.010217	-0.634077	0.5274
X(-2)	0.023894	1.486378	0.1402
X(-3)	0.034214	2.150145	0.0338

R-Squared= 0.230368**, Durbin-Watson Stat. =** 1.998112**, Prob (F-statistic) =** 0.000075

The empirical results indicate that domestic oil price has a significant positive impact on the general price level with a lag of three periods. The reason for the positive impact is the dismantling of APM model and the also the high international oil prices which have a lagged impact via fiscal, and import channels result in the positive impact.

Table 4.5: The Empirical Results for the 3rd Sample Period (November 2008 to September 2014)

Variable	Coefficient	t- Statistics	Prob.
C	0.146341	2.453882	0.0167
Y(-1)	0.334588	2.726897	0.0082
Y(-2)	0.047924	0.394101	0.6948
X	0.020782	2.559506	0.0127
X(-1)	-0.014119	0.753112	0.4540
X(-2)	0.146341	-0.542913	0.5890

R-Squared= 0.324658**, Durbin-Watson Stat. =** 2.014348**, Prob (F-statistic) =** 0.000061

In the final subsample, the results indicate that the impact of oil price is directly affecting the general price level. The main cause for this is the deregulation policy of the oil sector. That means the general prices of the economy are fully linked with the oil prices, and the domestic oil prices are now linked to the international oil prices.

4.6 Conclusion

The Indian economy is a heavy import dependent economy, imports more than 80 percent of its oil imports. This heavy import dependency has many hazardous implications for the health of the economy. The heavy burden of subsidies on the one side leads to fiscal deficit and on the other hand, the heavy imports leads to an increase in current account deficit and hence hinders the growth process of the economy. Keeping in view the ill effects of the fiscal burden then government of India constituted committees time and again for analysing the oil pricing, and the deregulation process has been started in 19997 after the dismantling of the APM model. But as the deregulation process goes on, the nature of domestic prices has changed and had shown a volatile nature and the way the pattern of impacting the

general price level has changed also. Here the way oil prices are fluctuating and the increasing impact on the general price level has some more hazardous implications for the economy than with those having through fiscal burden. As the nature of oil prices are becoming unpredictable at international level(as seen from last few months),means the same impact will be on the general price level and hence to control the price becomes out of control from the monetary authority. This may lead to policy failure (policy paralysis). Now there seems two option for the government either to control the domestic oil price and have the fiscal burden or to go for deregulation as the process is going on and have to face the uncertainty in the oil prices and hence for the general price level. So there is a need of like a cost-benefit analysis of choosing the policy option. But one thing is clear an economy heavy import dependency of more 80 percent and deregulating the same is to leave the economy for the price and policy determination of nations having the control on these products.

CHAPTER 5

Money Supply: A Compositional Analysis

Money supply is a matter of interest to the Central bankers and for the economists. As there is a continuing debate on the relative importance of money supply studies, whenever there is the study of any economic system. Although having different ideologies regarding the money supply and its role as the extreme monetarists implies that the money alone matters and all other assets (real and financial) are close substitutes for money. On the other hand, extreme Neo-Keynesianism rests on the premise that 'money does not matter' and the changes in interest rates of a certain range of financial assets alone are important (Chona, J.M, 1976). The money supply being one of the important factors responsible for the changes in the macroeconomic variables in the economy and has fundamental importance in the economic discipline. The debate on the role of money supply in the determination of price level is ages old and has its relevance in all periods of the time. According to the quantity theory of money, inflation is always and everywhere a monetary phenomenon, produced in the first instance by an unduly rapid growth in the quantity of money (Friedman 1968, p-18). Friedman's assertion is not that an increase an increase in money supply growth rate is the sole cause of inflation in the long run, but just the most important cause (Friedman 1980). However, our concern is also to make deliberations on the cause and effect relationship between money and inflation,but not directly. We are going through in detailed analysis of changing nature of determinants of money supply and how they are having an effect on inflation.

The monetarist school of thought (Milton Friedman) of the view that inflation is always and everywhere a monetary phenomenon and argued that the change in money supply is one of the important factors responsible for the rate of change in price level. The money inflation nexuses have been well documented in the well-known quantity theory of money is captured in the following equation.

$$MV = PY$$

Where

M = Money supply/ quantity of money

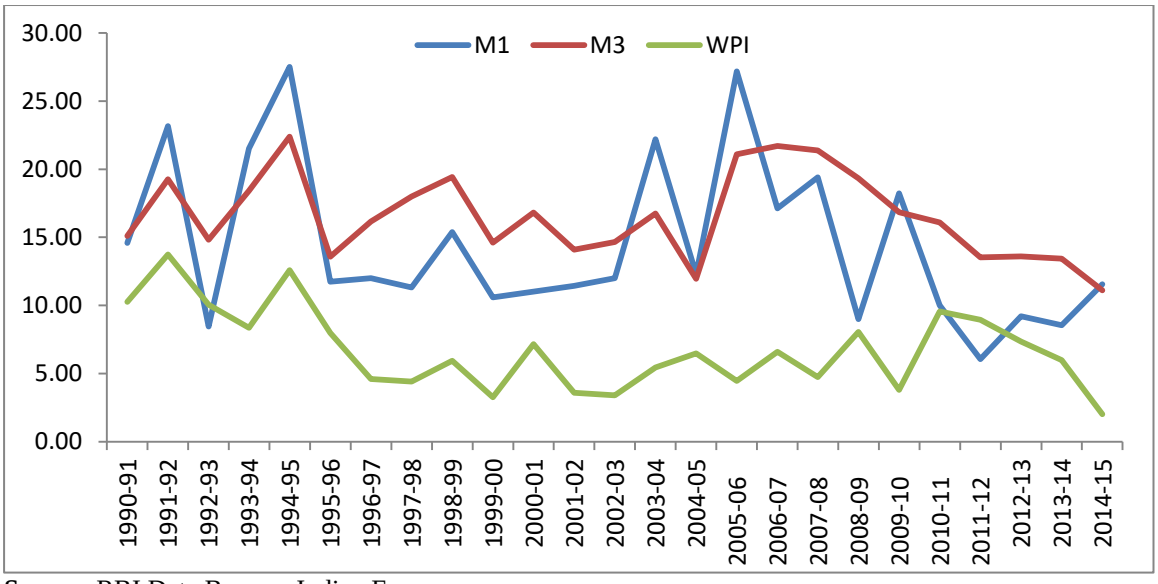
V = Velocity of circulation of money

P = General Price level

Y = Real national income

The above equation states that the total value of payments is equal to the money value of output.Classical economists by introducing some assumptions converted the above identity a tautology, into meaning full theory the celebrated quantity theory of money, (Jadhav, N, 1994, p-14) which explains the impact of the change in money supply on the price level. If"V" is assumed to be remaining constant, then every change in M will produce a similar change in either price level or real national income. If however the economy is operating at full employment or close to the full employment level of output, then changes in Y are harder and therefore every change in M will cause only the P to change. On the other hand if the economy operates at less than full employment level of employment level of output, then a change in M will get reflected more in Y than in P. hence, the proponents of this version states that changes in money supply always produce changes in either P and /or Y according to them money, money does matters and whenever there appears excessive increase in P (i.e. inflation), it is primarily because of the excessive increase in the money supply(K. G. Kulkarni, 1999)

Figure 5.1: Money Supply and Inflation From 1990-91 to 2014-15



Source: RBI Data Base on Indian Economy

Although the link between growth in money supply and the price level is well established our attempt in this chapter is only to support the argument of important of

money supply in the economy and hence makes an attempt to find the ultimate determinants of the money supply in the post-reform period. The graph pertinently above shows the relationship between the money supply (M_1, M_3) and the inflation in the post-reform period in India. Here it is interesting to analyse the close association between the money supply and inflation. They the moving in the same way however the fact is that the volatility in the M_3 is more than that of M_1. This volatility may be because of inclusion of the time deposits in the M_3 as against M_1. Because of this close association with one of the important macroeconomic variables of the economy, it seems now hot debatable question which needs to be answered. What is the nature and pattern of money supply in the post-reform period? What are the major determinants of money supply in the study period? How the nature of the determinants of money supply has changed in the post-reform period? It is in this backdrop that we are making an attempt to answer some important questions in this chapter.

5.1 Determinants of Money Supply

Broadly researchers reported that there were two major approaches to the money supply determination in India; balance sheet approach or structural approach and money multiplier approach. The money multiplier approach focuses the relation between the money stock and reserve money, while as the structural approach favours analysis of individual items in the balance sheet of the consolidated monetary sector in explaining the variation in money stock (Jadhav, N, 1994, p-106). The money multiplier approach emerged strongly as a critic to the balance sheet approach, and because of if this it lead to a big debate in the early 80's a hot a rich debate between two groups of researchers, one group lead by Gupta who believed in the money multiplier theory, the other group of RBI economists, who were not accepting this theory. The analytical difference in the two may appear to be confined to be two different points of departure; the difference to an extent, however, also reflects the deeper division between monetarist and non- monetarists. It was especially Gupta (1976)who in his article vehemently criticises the manner in which RBI carries out the analysis of money supply in India. Gupta argues that the RBI's analysis is tautological and whole analysis by RBI which is only an accounting analysis is empirically devoid of meaning and hence in favour of complete methodological revision. One of the

main reason for supporting the methodological revision was that there should be the incorporation of behavioural and other leading (real) factors into the money supply analysis (Srinivasa Rao, 1977). It is actually this inclusion which will serve as the base for the real analysis and the factors responsible for the money supply within the economy. In this backdrop, our concern is also making an attempt to have a detailed analysis for the money supply analysis in the post-reform period. The whole analysis is based on the money multiplier process.

5.2 Money Multiplier Process

The money multiplier theory offered by Gupta as a convincing explanation of money supply process and changes, if correctly interpreted and applied, has indeed a very high predictive power (Srinivasa Rao, 1977). Before going to a detailed analysis of money multiplier analysis, it is essential to have an understanding regarding the definition and concept of ordinary money (M) and high powered money (H), as these two are serving as the basic building blocks for the money multiplier process and hence for money supply. In the monetary literature money (M) is usually defined in two alternative ways, one is called the 'narrow' definition of money and the broader definition of money. Empirically the M (narrow) is defined as the sum of currency held by the public plus demand deposits (D) of the banks plus other deposits of RBI. When we are talking about the broader definition of money (M_3), then the M_1 is added by the time deposits. So;

$$M= C+DD+OD \qquad (I)$$

On the other hand, the high powered money (H) is, however, the original fiat money produced by RBI and government of India and held by the banks and the public. Simply it is the government money (Gupta, 1976). The RBI calls H the reserve money. H comprises the currency held by the public (C) cash reserves of banks (R) and other deposits of RBI (OD). So:

$$H= C+R+OD \qquad (II)$$

On comparing the (I) and (II) the only difference is that the former includes the D while as the later includes the R. It is this difference which attributes the H the

quality to be high powered. It is because of the fact that banks in a fractional reserve system (as is the case in Indian economy) a part of total cash is only in the form of reserves is the basis on which whole edifice of credit and deposit is build, or the power of R to serve for the multiple creation of DD lends H the quality of high powered-ness.

In its simplest form of money multiplier approach, the money supply is highly stable increasing function of high-powered money (H) alone. Means the direction of change in M is in the same way as in H.

In the simplest form the money multiplier approach is based on the following equation:

$$M^s = m.\ H \qquad \text{(III)}$$

Where

M^s = Nominal Money Stock/Money Supply

M= Money Multiplier

H= Nominal Reserve Money/ Base Money

As already mentioned above H is the sum of C+R[1] and M is the sum of C+DD. In order to determine the factors responsible for the change in money supply, we can also write (III) as follows[2]:

$$M = \frac{1 + c + t}{c + r(1 + t)} . H$$

Where:

c= C/DD is currency deposit ratio

t=TD/DD is ration of time to deposit ratios

r = reserve deposit ratio

Hence from the above equation, the money multiplier approach suggests that there are two major determinants money supply, and are $1 + c + t / c + r(1 + t)$ or "m" or money multiplier and the H or the reserve money. Or the equations permits changes in money stock decomposed into its "proximate determinants" (Freidman and

[1]Although both C and H include the OD as one of the component, but in both the cases its contribution very insignificant hence from now onwards for simplifying the analysis we are going to ignore it.

[2]For the detailed derivation of the see the Appendix.

Shawrtz, 1963), (Caga, 1956) and the exogenous monetary base (H). However, the movements multiplier largely reflect the behaviour of public and banks and the very short monetary movements caused by these changes are predominate. Hence having precise control over the behaviour charters by the central bank is impossible. But over the long run, the high-powered monetary base is more important, as it is more often know as policy controlled. Hence it is interesting to have deliberation on the sources 'm' and 'H' both so that we can come to a conclusion how these factors have changed over the period of time, and what is their nature since the major reforms have been initiated in the Indian economy.

5.3 Trends in Money Multiplier (m) and the Base Money (H)

From the above analysis it becomes clear that, in determining the money supply, there are mainly two factors i.e. 'm' and 'H' which ultimately determines the money supply in the economy. It becomes relevant here to have a trend analysis of the both the factors and hence come to a conclusion how the factor factors are affecting the money supply and how their nature have changed over the period of time. From the table, we try to understand the trends of both the factors.

Figure 5.2: Changes in 'm' and 'H.'

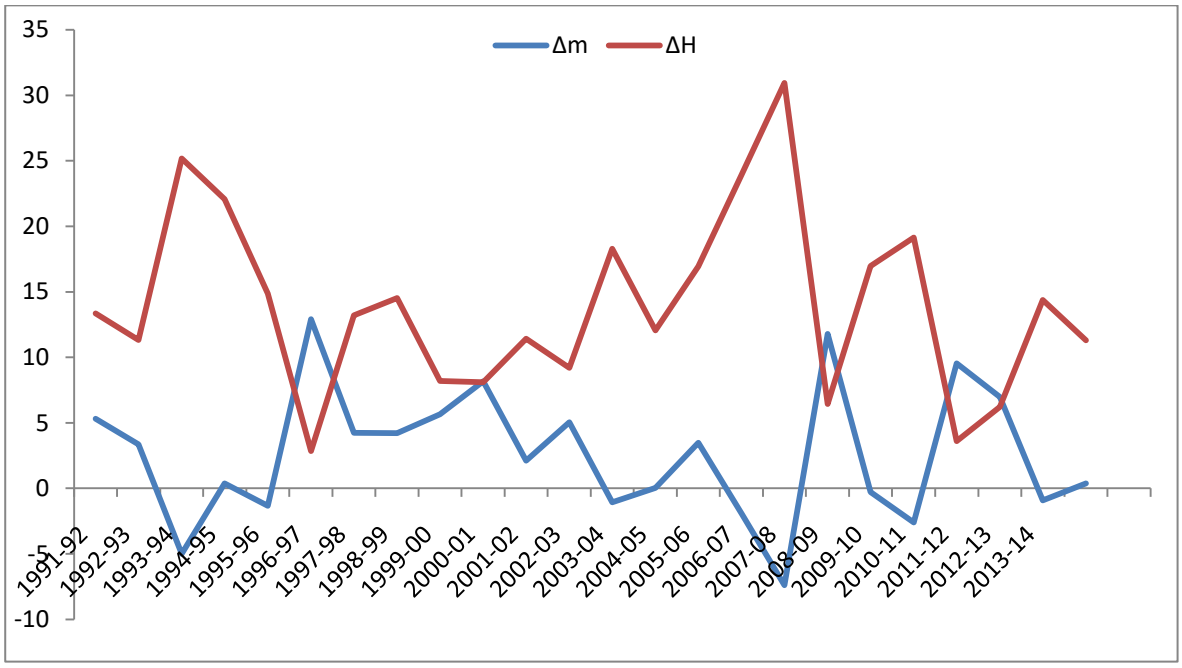


Table 5.1:Changes in Money Supply(ΔM) Arising from Changes in money multiplier(Δm) and High Powered Money(ΔH) from 1990-91 to 2014-15

Year	H	ΔH	m	Δm	M	ΔM	%age Change in M due to H	%age Change in M due to m
1990-91	877.79		3.04		2672.05			
1991-92	995.05	13.36	3.21	5.32	3190.01	19.38	68.94	27.45
1992-93	1107.79	11.33	3.31	3.35	3670.53	15.06	75.23	22.24
1993-94	1386.72	25.18	3.15	-5.00	4365.07	18.92	133.09	-26.43
1994-95	1692.82	22.07	3.16	0.38	5349.02	22.54	97.91	1.69
1995-96	1944.57	14.87	3.12	-1.33	6062.73	13.34	111.47	-9.97
1996-97	1999.85	2.84	3.52	12.92	7040.63	16.13	17.61	80.10
1997-98	2264.03	13.21	3.67	4.23	8307.86	18.00	73.39	23.50
1998-99	2592.85	14.52	3.82	4.21	9915.11	19.35	75.04	21.76
1999-00	2805.55	8.20	4.04	5.64	11333.98	14.31	57.30	39.41
2000-01	3032.94	8.11	4.37	8.17	13253.79	16.94	47.87	48.23
2001-02	3379.52	11.43	4.46	2.12	15081.38	13.79	82.89	15.37
2002-03	3690.38	9.20	4.69	5.04	17298.06	14.70	62.59	34.29
2003-04	4364.90	18.28	4.64	-1.06	20241.93	17.02	107.40	-6.23
2004-05	4891.11	12.06	4.64	0.04	22691.41	12.10	99.67	0.33
2005-06	5719.32	16.93	4.80	3.47	27454.99	20.99	80.66	16.53
2006-07	7088.61	23.94	4.71	-1.91	33377.30	21.57	110.99	-8.85
2007-08	9282.75	30.95	4.36	-7.38	40481.94	21.29	145.37	-34.66
2008-09	9879.61	6.43	4.87	11.78	48162.15	18.97	33.90	62.10
2009-10	11556.53	16.97	4.86	-0.29	56173.93	16.64	101.98	-1.74
2010-11	13768.21	19.14	4.73	-2.61	65177.55	16.03	119.40	-16.28
2011-12	14263.44	3.60	5.19	9.54	73966.45	13.48	26.71	70.77
2012-13	15148.86	6.21	5.55	6.99	84045.54	13.63	45.56	51.28
2013-14	17327.39	14.38	5.50	-0.90	95262.22	13.35	107.72	-6.74
2014-15	19284.71	11.30	5.52	0.37	106415.78	11.71	96.50	3.16

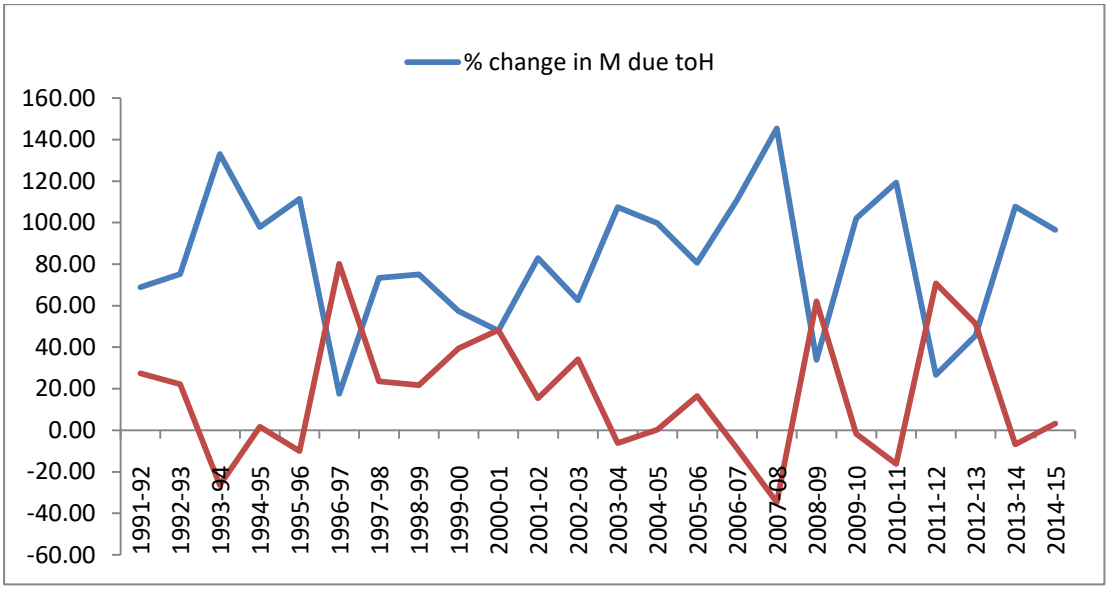
Source: RBI Data Base on Indian Economy

From the figure 5.2, it is clear that there is the upper hand of 'H' as compared to 'm' and also it both moves in the opposite direction. However, it is important to

note that whenever there is uneven happen there is policy intervention by the monetary authorities and hence the change in 'H'. In the early reform period, there have been major reforms in the economy including the financial reforms and hence the policy intervention on a large scale hence leads to change in H very high. Then in 2008-09 there were the global financial crises in order to protect the domestic economy from these financial shocks policy intervention had been made and in 2009-10 to 2010-11 there was the domestic inflation pressure, to curb the same policy interventions had been made. In general, there is upper hand the 'H' as compared to 'm' and hence the policy or the non- behavioural variables are paying more important role than those of behavioural variables.

Now making it more relevant we try to show the changes in money supply due to changes in 'H' and 'm' and hence will become clear that over the period of time which factor had played a significant role in money supply in the economy.

Figure 5.3: Percentage change in M due to change in H and change in m



Again the same story seems emerging from the above graph, that the 'H' effects are more than 'm' effects. That means to say the 'H' has the significant power to impact the money supply in the economy. However for some years the 'm' effect is negative like 1993-94, 2008-09 and 2010-11. There may be many reasons, but the one or the most important is the increase in the currency ratio, which would have more

than offset the impact of a decline in the reserve ratio. However it become more relevant to argue when we are going make the analysis of 'm'.

Hence what emerges from this type of trend analysis that for the whole post-reform era the 'H' effect swamped the 'm' effect on money supply. This implies that inflation pressures cannot be ascribed to 'm' although they have been exacerbated by it. In other words, given the relatively smaller impact of money multiplier on money supply, the policy issue from the point of view of monetary management in the context inflationary environment monetary expansion has to be controlled mainly by operating on 'H'.

5.4 Sources of Change in Money Multiplier (m)

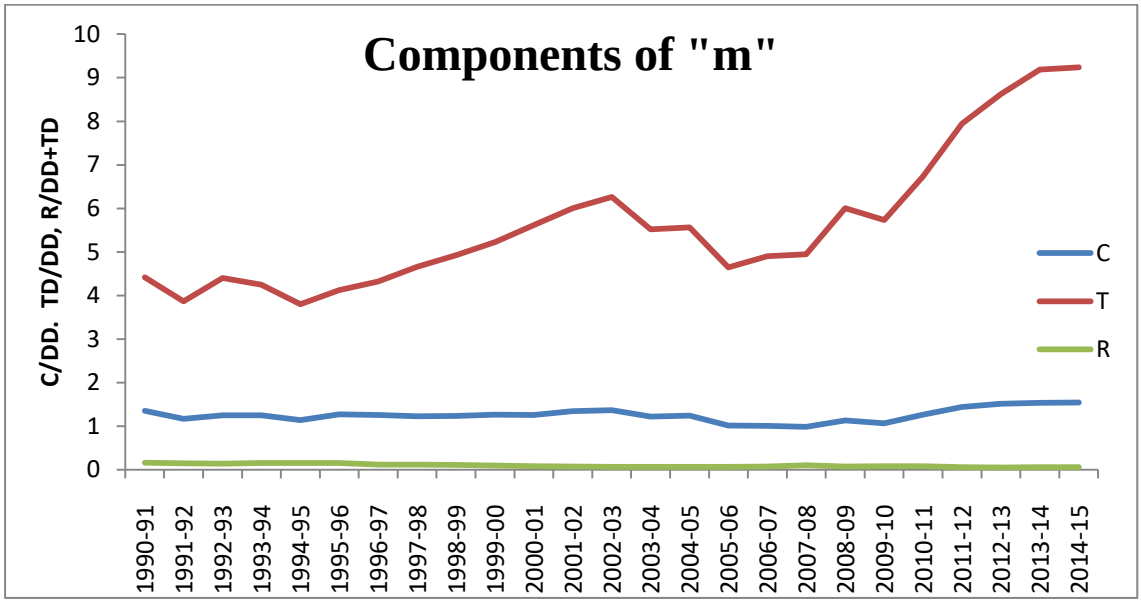
The variation in the money multiplier is mainly related to three key ratios i.e. c, t, r. these are also called the "proximate determinants"However they are not the ultimate determinants of money multiplier and hence of the money supply. It is because that ratios are behavioural in character. Although they are providing a vantage point from which to observe the simultaneous interaction of various forces determining the money multiplier and hence the money supply. Now, we will try to interpret the ratios individually, so that we can come to a conclusion how the nature of the ratios has changed over the period of time and ultimately their impact on the general money supply.

Table 5.2: Money Multiplier and its components from1990-91 to 2014-15

Year	c=C/DD	t=TD/DD	r= R/DD+TD	m= (1+c+t)/(c+r(1+t)
1990-91	1.35	4.42	0.16	3.04
1991-92	1.17	3.87	0.15	3.21
1992-93	1.25	4.40	0.14	3.31
1993-94	1.25	4.25	0.16	3.15
1994-95	1.14	3.80	0.15	3.16
1995-96	1.27	4.12	0.15	3.12
1996-97	1.25	4.32	0.12	3.52
1997-98	1.23	4.66	0.11	3.67
1998-99	1.24	4.93	0.11	3.82
1999-00	1.26	5.23	0.09	4.04
2000-01	1.26	5.62	0.08	4.37
2001-02	1.34	6.00	0.08	4.46
2002-03	1.37	6.26	0.07	4.69
2003-04	1.22	5.52	0.07	4.64
2004-05	1.24	5.56	0.07	4.64
2005-06	1.01	4.65	0.07	4.80
2006-07	1.01	4.90	0.08	4.71
2007-08	0.98	4.95	0.10	4.36
2008-09	1.13	6.01	0.08	4.87
2009-10	1.07	5.73	0.08	4.86
2010-11	1.26	6.73	0.08	4.73
2011-12	1.44	7.94	0.06	5.19
2012-13	1.51	8.62	0.05	5.55
2013-14	1.53	9.18	0.06	5.50
2014-15	1.55	9.23	0.06	5.52

Source: RBI Data Base on Indian Economy

Figure 5.4: Components of money Multiplier (m)



5.4.1 Currency-Deposit Ratio (c =C/D)

The currency deposit ratio represents, on the one hand, adoption of banking habits by the people and on the other hand, it is the measure of their confidence in the banking system. However, another aspect of the currency-deposit ratio that is mainly our concern in the study is how they are affecting the money multiplier and then untimely money supply. As the money stock is negatively related to currency-deposit ratio because a rise in (C/DD) brings about a shift from deposit to currency and since deposits, undergo multiple expansions while currency does not, the net result is a contraction of money multiplier and of the money stock.

The currency-deposit ratio has shown an interesting trend in the post-reform era, as it has shown a declining trend in the initial reform period (if however very meagre) then remained constant for a long period of time and then again has shown a declining trend if later on it has again changed its path. All the three rather four periods have relevance with the dynamics of macro-economy of the Indian economy. Keeping in mind the behavioural character of the ratios, during the first period (1990-91 to 1994-95) the economy has come across with the major economic reforms after the deep macroeconomic crises. Then the economy was in a stable mode in early 2000's and later 2000's the economy was on boom achieving its highest growth rates with almost the macroeconomic variables favourable and hence the ratio has shown a

declining trend. In the recent, we are analysing the trend is again showing the upward movement that is because of the deteriorating health of the economy. As the non-bank public decides on how much of its wealth to hold in the form of currency. But typically although the demand for currency rises with wealth, the elasticity is less than one, so that an individual's currency deposit ratio declines with an increase in wealth. For the economy as a whole as national wealth increases, the currency-deposit ratio decreases. As it is an important factor in determining the money multiplier and hence money supply as and has a negative relationship with the 'm'. So controlling the ratio and hence the money supply has its impact on the macroeconomic variables in general and price level in particular.

5.4.2 Time Deposit-Demand Deposit Ratio (t= TD/DD)

The time deposit-demand deposit ratio has an important implication for the money multiplier again and hence for the money stock in the economy. As there is an increase in TD/DD ratio means the availability of free reserves and consequent enlargement of the volume of multiple deposit expansion leads to monetary expansion.

From the figure 4.4, it is clearly indicated that the in whole post-reform era there is an increasing trend of the TD/DD ratio. There may be two important reasons for the upward movement in the era, one higher interest rates on the time deposits and the greater awareness regarding portfolio adjustments brought about by financial deepening and diversification. As the economic reforms started in 1990's the financial liberalisation also proceeded, there is a shift in monetary policy stance with greater reliance on market-based indirect measures and less on direct monetary control. Such shift could have a significant impact on day-to-day interest rate movements. These interest rates would, in turn, have implication for money supply as variations in interest rate may affect the money multiplier. In financial liberation process, the government control on bank lending, especially to the private corporate sector, or removal of interest rate ceiling also have a significant implication. As per the financial deepening and diversification is concerned there had been policy

intervention by the government and RBI in the form of financial inclusion[3], recently Pradhan Mantri Jan-DhanYojana and many other policies which have made a well-playing field for the financial awareness, portfolio diversification, and financial deepening.

5.4.3 Reserve/ Deposit Ratio(r= R/TD+DD)

In the reserve-deposit ratio, the reserves are mainly two types, the statutory reserves (where the banks have no choice) and the excess reserves (banks have their own choice). Although there isn't any significant movement in the reserve-deposit ratio in the post-reform era, but the shift in the ratio from 0.16% to 0.06% has its implication for the "m". The change in the ratio is mainly associated with the rate of growth of demand deposits, the rate of growth of time deposits compared with demand deposits and the behaviour of actual reserves. The more rapid increase in the time deposits and the demand deposits lower will be the reserve ratio and higher the level of reserves (statutory or excess) higher will be the ratio of the reserve ratio. As already discussed above that the masses are now more banking oriented as the time deposits have shown an increasing trend in the post-reform era. There are many factors such as interest rate deregulation, financial deepening, portfolio diversifications, etc. responsible for this increasing trend and had its impact on the reserve deposit ratio. Also, one more important point to note here is that declining rate of growth of reserve ratio means banks are earning a profit and also that they have greater confidence in people's banking habits.

From the above analysis, it is now clear that there has been a dramatic compositional shift in the determinants of 'm' and this shift ultimately have serious policy implications as well. The dramatic increase in time deposit-demand deposit ratio (t) is a positive signal in the way of maturing the financial character of the economy. It seems what actually is happening in the economy from last few years due to some flagship programmes like financial inclusion. This financial deepening may also help the policy makers to have a control on the target variables and hence make

[3]In the Indian context, the term 'financial inclusion' was used for the first time in April 2005 in the Annual Policy Statement presented by Y.Venugopal Reddy, Governor, Reserve Bank of India. For details see (RBI 2005-06)

the policy a success. But what is a major cause of concern is that the factors determining the 'm' are behavioural variables and having a complete control on them is impossible. And also it is illogical to have complete faith on the character of these variables and frame policies. Now there is need to understand the character of policy variables and how they have changed over the period of time.

5.5 Sources of Change in High Powered Money (H)

As we have seen from the derivation of the money multiplier process the two prominent factors responsible for the controlled variation only supply are the "m" and "H". That means to say, that to control the money supply in the economy we should have the control of the two factors very well. In order to know how to control we must know what are the sources of variation and their relative importance, nature and *modus operandi* of each source as we have done in the case of the "m" similarly, we are going to make deliberations on "H" also.

'As already defined high powered money was empirically defined to comprise (1) currency held by the public, (2) cash reserves of banks and other deposits of RBI. Some (relatively small) part of currency is directly issued by the government; the rest is all Reserve Bank Money(RBM). The cash reserves of banks are held partly in the form of currency as cash in hand and partly as deposits with RBI. Therefore, H can be defined as the sum of government currency and the RBM held by the public and the banks (Gupta, S.B 1979). This H is also known as reserve money by RBI(Gupta S B 1982).

An alternative way to look into the reserve money is to recognise it as the set of net monetary liabilities of the central bank. Since these liabilities are created in the process of generating matching assets by the central bank, the sources of change in the reserve money could be meaningfully examined through the balance sheet of the central bank. The balance sheet identity for the RBI can be identified in the following form[4]:

[4]We have followed the Suraj B. Gupta, as in his book *Monetary Economics Institutions Theory and Ploicy*

Monetary Liabilities + Non-Monetary Liabilities= Financial Assets+ Other Assets

Or Symbolically,

$$ML+NML = FA + OA$$

$$Or \quad ML = FA – (NML-OA)$$

As monetary liabilities of the RBI are the same as the RBM, so:

$$RBM = ML = FA – (NML-OA) \qquad (SS)$$

This simple identity defines the Reserve Bank Money or the monetary liabilities of the RBI as the excess of its financial assets over its net non- monetary liabilities. The main purpose of the identity is to provide the simple framework in which to study the operation of multifarious factors which are responsible for the variations in RBM. The most important point to note here is that RBI does not change the H (RBM) by a mere fiat or completely arbitrarily. Rather, there is an intricate but the definite system whereby changes in H (RBM) occurs. For this purpose to identify the proximate factors governing H, all the RBI's transactors may be divided into four sectors viz.(1) the government (2) banks (3) development banks, and the (4) foreign sector.

Following the four-fold sector classification of the RBIs transactors, all (net) financial assets of the RBI are divided under the corresponding four sector categories. Then the equation (SSS) can be written in the following way:

Reserve Money = Net RBI Credit to Government
+ RBI Credit to Banks
+ RBI Credit to Commercial Sector
+ Net Foreign exchange Assets of RBI
+ Government's Currency liabilities to Public
Less Net Non- Monetary Liabilities of RBI

Accordingly, changes in reserve money (H) could be traced to the changes in assets acquired by the RBI in the course of its operation.

Table5.3: Sources of High Powered Money

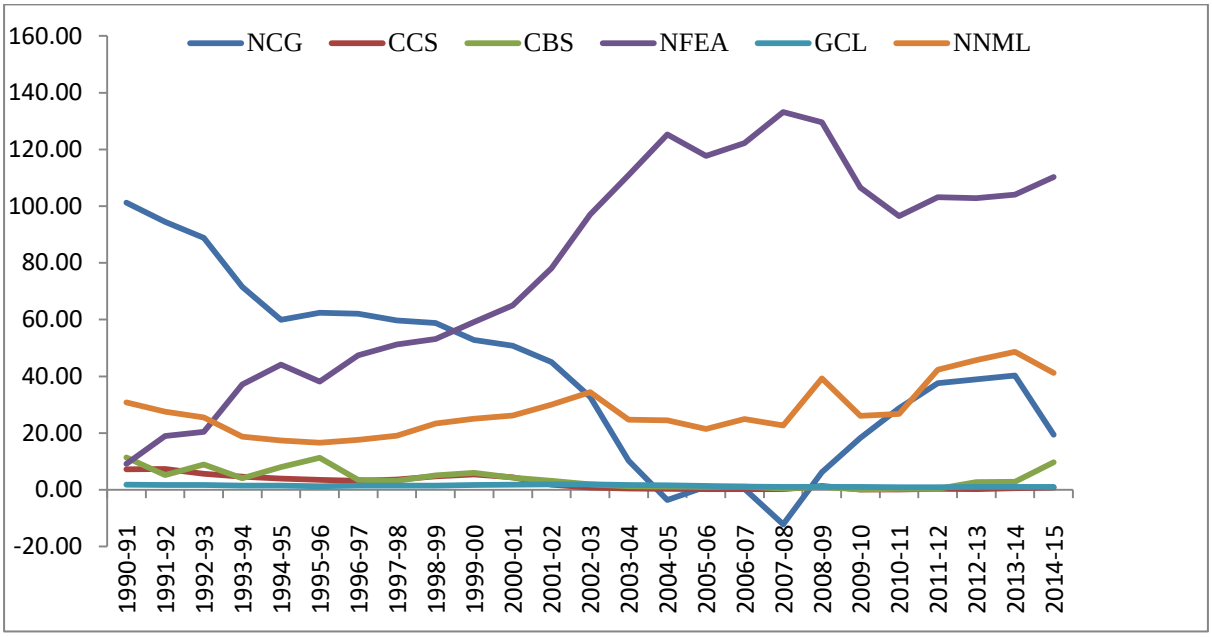
Year	Net RBI Credit to Govt.	Bank Credit to Commercial Sector	RBI Credit to Banks	Net Foreign Exchange Assets of the RBI	Govt.'s Currency Liabilities to the Public	Banking Sector's Net Non-monetary Liabilities
1990-91	101.22	7.22	11.40	9.09	1.85	30.78
1991-92	94.48	7.30	5.13	18.93	1.71	27.55
1992-93	88.87	5.61	8.92	20.44	1.65	25.50
1993-94	71.61	4.65	4.00	37.08	1.44	18.78
1994-95	59.95	3.89	7.96	44.14	1.41	17.34
1995-96	62.40	3.53	11.29	38.10	1.29	16.61
1996-97	62.10	3.12	3.50	47.41	1.46	17.59
1997-98	59.70	3.62	3.13	51.19	1.48	19.12
1998-99	58.83	4.72	5.11	53.21	1.48	23.35
1999-00	52.85	5.44	5.98	59.13	1.63	25.03
2000-01	50.73	4.38	4.27	65.01	1.77	26.17
2001-02	45.03	1.75	3.18	78.11	1.88	29.96
2002-03	32.70	0.83	1.94	97.08	1.92	34.46
2003-04	10.29	0.47	1.24	110.98	1.67	24.65
2004-05	-3.67	0.28	1.07	125.29	1.52	24.49
2005-06	1.15	0.24	1.01	117.67	1.34	21.42
2006-07	0.34	0.22	1.08	122.19	1.15	24.98
2007-08	-12.20	0.19	0.49	133.16	0.99	22.65
2008-09	6.23	1.40	1.05	129.57	1.02	39.27
2009-10	18.31	0.11	0.10	106.60	0.98	26.10
2010-11	28.80	0.16	0.37	96.50	0.92	26.75
2011-12	37.56	0.28	0.34	103.21	0.94	42.33
2012-13	38.98	0.20	2.66	102.85	1.01	45.71
2013-14	40.32	0.51	2.81	104.03	1.00	48.67
2014-15	19.36	0.77	9.73	110.31	1.01	41.18

Source: RBI Data Base on Indian Economy

An examination of the sources of change in the factors responsible for the changes in the H (reserve money) has to make a dramatic change over of the period of post-reform era. Why the roles of some factors have increased while others have declined or there have been movements in the nature of the factors over the period of

time. Here we make an attempt to make the deliberation on all factors for the data given.

Figure 5.5: Sources of High Powered Money



5.5.1 Net RBI Credit to Government:

According to RBI(1977) its net claims on the government comprises mainly in the form of the rupee securities held in the issue department, treasury bills purchased and discounted, investment in government securities, loans advances to the state governments, rupee coins in issue and banking department fewer government deposits with the RBI. Although the net increase in Reserve Banks credit to the government is the rough measure of deficit financing of government and hence has its impact on H in the economy. This deficit financing leads to increase in the money stock in the economy on the one hand and on the other side it allows no scope for the RBI/ monetary authority to control the same, so may the main cause of policy failure. So in this backdrop, with the intention to ensure inter-general equity in fiscal management, long-run macroeconomic stability better coordination between fiscal and monetary policy, the government came with FRBM Act 2003(Chelliah, R. J , 2004). Despite the aforesaid, what is more, important that the Act prohibits borrowing by the government from the RBI. The act also bans the purchase of a primary issue of central government

securities by the RBI after 2006, preventing the monetization of the government deficit.

As is evident from the data the net RBI credit to the government is one of the main sources for the creation of H and hence the main source for the creation of money stock in the economy. As is prevalent from the data in the early reform period its contribution was very significant and then has significantly declined up to 2007-08andmake its contribution negative. One of the main reasons for this decline would be the implementation of the FRBM Act 2003. However, there comes the pertinent question the, the reason why it has again made an upward movement. This may be because in the wake of global financial crises the Act was suspended and the fiscal consolidation as mandated by the FRBM Act was put on hold in 2007-08. This suspension and the macroeconomic problems especially the high inflation rates have again lead to the emergence of the role of net RBI credit to government in H.

5.5.2 RBI Credit to Banks:

One important source change in H is the Reserve Bank's Credit to scheduled banks. The RBI provides credit to the banks through loans, advances against the government securities, usance bills or promissory notes as collateral or through purchase or redistributing internal commercial bills as well as treasury bills etc. although the data relives that the share of Reserve Bank's Credit to scheduled commercial banks have remained stable over the period of time. The major cause of this stability is that, as RBI is the 'lender of last resort' and whenever banks feel banking panic, excessive currency and clearing drains, the RBI must then come to their rescue. Banks as a whole can also be victims of substantial loss; if there is a big enough shift in the asset preference of the public from bank deposits to currency. In the latter case, we have seen from the data that there isn't any such shift rather there is a decline in the currency deposit ratio and hence increase in the bank reserves also. Therefore does not require any rescue operation from RBI. Although some individual banks can be subjected to further drains, i.e. clearing drains, to other banks within the system. Normally, the total reserve position of banks as a whole is not tight and hence is in a position to meet their needs for cash in the inter-bank call money market. Hence for this purpose, there isn't significant from the RBI for this purpose so remains stable over the period of time.

5.5.3 Reserve Bank Credit to Commercial Sector:

Although RBI does not provide credit directly to the commercial sector, but only indirectly through banks and development banks. According to RBI (1977), these funds (credit) may be disbursed in the form of investment in bonds/ shares, loans to IDBI, ARDC and others, internal bills purchased and discounted. The commercial sector credit had an important role in the creation of H ion the early reform period, and it had significantly declined as the reform period moved ahead. The main reason for this was that in the early period, the development banks had been established recently. There wasn't any major competition from the unorganised sector. And hence there hadn't been any option other than these banks for the commercial sector to fulfil their credit needs.

5.5.4 Net Non-Monetary Liabilities of the RBI:

The Net Non-Monetary Liabilities of RBI comprises paid-up capital, reserves, accumulated contribution to national funds, RBI employees' pension funds and corporation guarantee fund, compulsory deposits of public, etc. The NML are the excess of the non-monetary liabilities over assets. Although there has been a slight increase in the sample period; this may be because of increasing number of bank branches both in public as well as in private sector. Actually, these are the liabilities of RBI which do not have any monetary impact (RBI 1998).

5.5.5 Net Foreign Assets of RBI:

Those assets which are the net holdings of RBI represent the Reserve Bank credit to the foreign sector because they are the financial liabilities of the foreign sector, most of these assets are held in the form of foreign securities and cash balances. Therefore the accumulation of these foreign exchange reserves (excluding gold) represents the outflow of domestic savings to the abroad via Reserve Bank credit to foreign sector.

Since RBI is the custodian of the country's foreign exchange reserves and also has a major role in controlling the foreign transactions, it directly sells and buys a major portion of foreign exchange against India rupee. Although with the

implementation of Tarapore Committee (1997 through which on the one side the autonomy of RBI on foreign exchange convertibility has been reduced and on the other hand had made its impact on H. Tarapore committee had suggested full capital account convertibility although hadn't been implemented yet and we have only partial convertibility. Even though, this partial convertibility had its impact on the H. As the dramatic shift of increasing the role of Net Foreign Assets of RBI is because of openness of the economy along with the convertibility as suggested by Tarapore committee although implemented partially. It is because when the RBI (or others) buys foreign exchange, it pays it in terms of its own currency, and hence the supply of money stock (H) in the economy increases and conversely opposite happens in the case of selling foreign exchange. On the other hand, the foreign exchange reserves are dominated by dollars and their dominance is up to 90%. This has serious implications especially in the context of policy making, and that may lead to policy trapping by dollar colonization.This build-up of foreign currency reserves or especially US dollar reserves has resulted in the loss of central bank's control of monetary policy in effect of dollar colonisation of Indian economy (Shivkumar, 2016). The other side of the story is that the drastic decline in net RBI credit to government and bank credit to commercial sector means that the role of the domestic economy in the economic activity either in the form of expenditure or in the investment is declining. If this is true for any economy, then it is sure that we are totally losing our control from the domestic front and inviting the external economies to have a control on our economy.

5.6 Conclusion

Determination of money supply through the process of money multiplier leads to the conclusion that money supply is mainly determined by the two important variables, one is behavioural in nature (m), and the other is policy oriented (H). But the important question is what are the factors (sources) which determine these two variables and what is the nature of those factors (sources). In this process, we make an attempt and found the nature of the factors determining the "m" so called 'proximate determinants' c, t, r. It is found that in the post-reform era the nature of proximate determinants have changed significantly if not of all the three. The significant change in the nature of 't' (time-deposit ratio) as its role in determining 'm' (money-multiplier) has significantly increased because of two major reasons; one

higher interest rates on the time deposits and the greater awareness regarding portfolio adjustments brought about by financial deepening and diversification and other two have also changed their character if however not significantly. Similarly, factors (sources) responsible for the change in base money (H) have also changed their characters mainly because of policy interventions as discussed earlier if however not all the sources. But the significant shift has been seen in net RBI credit to government and net foreign exchange assets of the RBI. The building-up of foreign currency reserves (dollars) led to the expansion of high-powered money: short-term capital flows lead to foreign currency market interventions and a release of liquidity. This reserve expansion was once caused by the net RBI credit to the government when it had greater control over monetary policy, and now with this dramatic shift, the economy is throwing the control in the hands of foreign currencies. This leaves us susceptible to imported inflation." Inflation is driven not just by reserve money expansion, but also due to the sudden capital outflows, leading to spike in exchange rates[5] . These spikes, in turn, affect the prices of imported energy inputs. The Indian economy should migrate away from the dollarization as the countries like Russia, China and Iran are doing and increasing the invoice in respective domestic currencies, especially in energy trader (Shivkumar, 2016).And finally, there should be policy flexibility in order to take into account the nature and pattern of determinants of the money supply, so that we may have a control on the macroeconomic policy framework in the economy.

[5]As in the present context a major macroeconomics issue in Indian economy as the exchange rate is contiously fluctuates around the Rs 68 per US dollar

CHAPTER 6

Inflation and Monetary Policy Effectiveness

It is well accepted that the central objective of the macroeconomic policy is to have high and sustainable growth coupled with low inflation. On the one hand, high economic growth is determined by factors such as the quantity of capital, a qualified labour force, and advanced technology. These factors can be influenced by the government through fiscal policy and other technical policies, such as policies in trade, education, agriculture, industry, employment, so on. On the other hand, low inflation can be achieved by conducting a sound monetary policy, since in the long run inflation is generally believed to be a monetary phenomenon, while in the short and medium term; inflation is influenced by the relative elasticity of wages, prices and the interest rates. Therefore, many economists argue that the target of monetary policy should be inflation only.

Since time immemorial, inflation has always been an issue of extreme sensitivity. This sensitivity of the inflation accrues the fact that it has its consequences on the whole macroeconomic system. An instance of spiraling, uncontrollable inflation[1] is usually a sign of impeding catastrophic doom. Thus for the purpose of controlling the inflation monetary policy is a key constituent of overall economic policy across the industrial and emerging economies. From a standard textbook perspective and from our own experience we have come to known that monetary expansion reduces interest rates and enhance aggregate demand through an increase in investment and consumption spending. This increase in aggregate demand exerts a temporary influence on real output, while the upward pressure on prices is presumed to be of a permanent nature. In the same way the tightening of monetary policy leads to reduction of prices and a temporary fall in output. In practice the conduct of monetary policy involves the setting bank reserves or the short-term policy rates to obtain financial and monetary conditions consistent with achieving objectives of monetary policy. Policy shocks in the form of variation in the short-term policy rates or bank reserves set off a chain of events through changes in interest rate bank credit,

[1] Inflation does not necessarily have to be reflected a continued increase in the prices of commodities (hyperinflation), the vice versa can also be a reflection of inflation (deflation). However, both situations are more than unhealthy for the economy.

asset prices and foreign exchange rate affecting spending decisions of stakeholders of economy thereby ultimately affecting output and prices (Samantaraya, 2009).

Monetary policy framework in India has evolved over time with a shift in focus from the controlled expansion in the initial years to anti-inflationary in the recent years. This shift has emerged because of the developments in the government securities market and the money market brought about by the financial sector reforms that ultimately lead to the shift in the operating procedure of the monetary policy. Then there emerges a pertinent question that, whether the shift of monetary policy is relevant and successful policy intervening tool to have stable prices, given its basic objective. Although the objectives of monetary policy vary in different countries, in the United Kingdom, the objective of monetary policy is to deliver the price stability[2] implying low inflation and subjected to that support government's economic objectives including those for growth and employment. In the United States, monetary policy has two basic goals to promote maximum sustainable output and employment and to promote stable prices.

In India, according to Reserve Bank of India (RBI) Act 1934, the objectives of Reserve Bank are "…. to regulate the issue of bank notes and keeping of reserves with a view to secure monetary stability in India and generally to operate the currency and credit system of the country to its advantage. The formulation, framework and institutional architecture of monetary policy in India evolved over time around these objectives – maintaining price stability, ensuring adequate flow of credit to sustain growth and securing financial stability. Being price stability as one of the core objectives of monetary policy not only at national level but at the international level too, recently many countries[3]are going one more step ahead to target the inflation approach. With this, it is being assumed that price stability is explicitly the mandate and a quantitative target for inflation. In India, the importance of price stability as a key objective of monetary policy initially gains momentum with the onset of financial liberalisation when strong capital flows nudged the inflation into double digits. The

[2]Price stability in United Kingdom is defined by the government's inflation target of 2% and it varies from country to country taking into account the growth and development process of the economy.

[3]From 1990 to 2010 more than two dozen countries adopted the inflation targeting, as technique to tackle with the nuisance of inflation, prominent among them are Australia, Canada, New Zealand, United Kingdom etc.

importance of price stability was once again reinforced in 2004-05 when the country had to face sharp increases international commodity prices. More recently, from 2009-10- to 2011-12, RBI had followed a contractionary monetary policy stance to rein in surging inflation. In order to have a clear understanding of how effective is monetary policy, comes from the fact that how much transmission mechanism is effective, in order to achieve its targets and also using its instruments how much the monetary policy is successful in achieving its goals[4]. Although it is very well known fact that the signalling mechanism and hence the effectiveness in developed economies is very robust, they tend to be weak in case of major emerging market economies, particularly in the wake of market segmentation and absence of well-defined transmission mechanism. In the Indian context, the change in the framework and the operating procedure of the monetary policy since the later half of 1990's has necessitated the array of policy instruments for communicating shifts in monetary stance, whereby greater reliance is on price stability rather than quantity adjustment(Indranil Bhattacharyya, Rudra Sensarma b,, 2008). In this backdrop, the aim of this chapter is to examine whether monetary policy has effectively become successful, with the changing dynamics of macroeconomic structure in general and inflation in particular. We will also try to analyze the effectiveness via two approaches; first is to analyze the monetary policy transmission mechanism, for this we will estimate the "monetary condition index", second how the monetary policy instruments have changed over the period of time, and this changing pattern of policy instrument is sufficient to cope- up with the changing dynamics of the inflation.

6.1 Monetary Policy Framework and Operating Procedure in India

In the early 1990's the Indian economy underwent severe balance of payment crises; hence hit the whole macroeconomic framework, and lead to deviation of macroeconomic variables from the equilibrium path. It is also evident that one of the main macroeconomic variables that is inflation which were in double digit in the first half of the early reform period. With the macroeconomic stabilisation program

[4]In monetary policy theory a distinction is made between among goals, targets indicators and monetary policy instruments. However the distinction between goals and instruments is quite old, see(Tinbergen, 1952). The newcomers on the scene of theoretical discussion are the concepts of target and indicators. The relation among the above variables is followed by the sequence as: $Instruments \rightarrow Indicators \rightarrow Targets \rightarrow Goals$

initiated in against these crises, the economy started coming back on the stable path and hence the inflation. But after a stable macroeconomic period i.e. from the 2nd half of the 90,s to the first half of 2000's the macroeconomic framework started shaking again, with the result, inflation rate started rising again. To tackle these macroeconomic volatilities in general and inflation, in particular, monetary policy has a vital role to play.

Monetary policy operating procedure serves the purpose of nuts and bolts in the overall policy set of tactics such as choice of operating target and policy instruments, the nature and frequency of use of policy interventions, the width of corridor for the market interest rates and the manner of policy signals to effect desired changes in the intermediate targets. However, the efficacy of either monetary policy or policy tool can be best judged by its ability to unambiguously convey the policy signal of operating or controlling body (central bank) to the market and its influence to affect its operating targets with precision and accuracy.

On the other side of the ongoing process of economic integration, with a greater degree of trade openness and increasing capital flows have also imparted difficulties in targeting exchange rate inducing central banks to adopt the flexible exchange rate regime increasingly.As a flexible exchange rate in the emerging economies resembles with '*de-facto'* peg. Since these economies are characterised by underdeveloped financial markets, their central banks intervene in foreign exchange markets to stabilise the exchange rates. The phenomenon is often explained by "fear of floating"(Calvo.G Reinhart,C, 2000)Hence, exclusively reliance on either monetary targeting or exchange rate does not appear to be optimal for the monetary policy to be conducted smoothly. So the monetary policy has to face new challenges in order to be more effective. Also with the increase in volume and volatility of international capital flow coupled with intensified financial innovations have made financial markets and economic systems more and more interdependent. As the domestic financial markets become more closely linked to the global financial system, the exchange rate becomes increasingly important as a channel through which monetary policy may have a possible impact on the real economy along with interest rate and credit channel. As in conventional or micro-founded macroeconomic models with nominal price rigidities, monetary tightening raises the interest rate and reduces the demand for borrowed

funds; this is the monetary channel for the monetary policy. Microeconomic analysis of credit markets and the role of bank intermediation shows the potential importance of supply restrictions in the credit market; that is the interest rate does not simply clear the market for capital. This hypothesis that credit market imperfections play a major role in the transmission of monetary policy to economic activity is called the credit view (Bernake, 1986)(Blinder and Bernake, 1988). One more important issue in the case of developing economies like India; the credit markets play an important role to direct the flow of resources to productive sectors of the economy. For the monetary policy to be effective, it is therefore to have a broader understanding of these transmission channels. Accordingly, central bank would be increasingly monitoring and analysing the multiple transmission channels simultaneously in drawing policy perspective consistent with the evolving policy objectives.

6.2 Monetary Condition Index

In order to understand clearly how monetary actions influence monetary conditions and from there to go on to affect aggregate demand and inflation a comprehensive measure of monetary conditions in the context of economies, those having underdeveloped financial markets in general and in Indian context, in particular, appears to be great importance. In 1990 it was the central bank of Canada which came with the concept of monetary condition index (MCI), that may incorporate the possible channels of the transmission mechanism and on the basis of which we can analyse the monetary condition in the economy, and can formulate the policies accordingly. Ericsson, *et al.*(1997) indicates that MCI has several attractive features. It is easy to understand and to calculate, and it captures both the domestic and foreign influences on general monetary conditions of the country. Duguay, (1994) discussed fundamental economic motivation and usefulness of MCI. Arguing his favour of short-term interest rate and exchange rate then monetary aggregates in the case of Canada in 1990. It is actually the interest rate and exchange rate that affects total spending and prices.

MCI is a weighted average of the change in the domestic interest rates and exchange rates, relative to their values on a pre-specified base date. MCI could be constructed in terms of the effect on interest rate and exchange rate changes on either

"aggregate demand" or *"prices"*(Freedman, 1994). The functional form of the MCI is as:

$$\boldsymbol{MCI_t = w_{ir}(ir_t - ir_0) + w_{er}(er_t - er_0)} \quad (1)$$

Where MCI_t represents the monetary condition index, ir_t, er_t are interest rate, exchange rate, at time t in a given time period, $ir_0, er_0,$ are interest rate, real effective exchange rate, and credit growth rate in a given base periods, w_{ir}, w_{er} are weights attached to interest rate and exchange rate, in the MCI.

However, considering the peculiarities there is a need to capture a variable that will provide the information on another channel of the monetary policy transmission mechanism that is having its effect on the effectiveness of monetary policy. Literature provides enough evidence in support of criticality of credit stance as another important channel of monetary policy transmission(R. Kannan, Siddhartha Sanyal and Binod Bihari Bhoi, 2006) .Therefore, it is the need of the hour to include the credit channels in the estimation of MCI, so the proposed MCI which is an amplified version of the equation (1):

$$\boldsymbol{MCI_t = w_{ir}(ir_t - ir_0) + w_{er}(er_t - er_0) + w_{cr}(cr_t - cr_0)} \quad (II)$$

The symbols have their same meaning as mentioned in the equation (1); however w_{cr} is weight attached to credit growth rate and cr_t *and* cr_0 represents the credit growth rate at time *t* and g a given base period respectively.

These weights are derived from the estimated coefficients of *or, er and or* via aggregate demand function or the price functions. Both the estimation have been supported by the earlier studies(R. Kannan, Siddhartha Sanyal and Binod Bihari Bhoi, 2006; Zulfiqar Hyder and Muhammad Mazhar Khan, 2007; Ben S. Bernanke and Mark Gertler, 1995). However taking into account the importance of the study with reference to inflation, so for following (Zulfiqar Hyder and Muhammad Mazhar Khan, 2007), we are estimating the weights via the price equation.

$$\boldsymbol{\pi_{t=} \delta_0 + \delta_1 ir_t + \delta_1 er_t + \delta_1 cr_t} \quad (III)$$

Where π_t is the inflation rate, ir_t denotes interest rate, er_t denotes the exchange rate, cr_tdenotes growth rate of credit, with time period *t* and the parameters $\delta_1, \delta_2, \delta_3$ are the coefficients of interest rate, exchange rate, growth rate of credit respectively.

However we are dealing with time series data, it is mandatory to investigate the nature of data in order to overcome from these spurious regression results. In this estimation, several statistical techniques and steps must be taken. First of all, unit root test has been applied to each series individually in order to provide information about stationarity of data. The existence of unit root to determine the degree of differences in order to obtain statistically stationary series of variables; inflation, the rate of interest, exchange rate and credit growth rate, Augmented Dickey Fuller Test (1979,1981) is applied.

Table 6.1: Augmented Dickey-Fuller (ADF) Unit Root Test (Stationarity Test)

At Level			**At 1st Difference**	
Variables	**T-Statistics of ADF**	**P-Value**	**T-Statistics of ADF**	**P-Value**
$\boldsymbol{\pi_t}$	2.72	0.07	-4.22**	0.00
$\boldsymbol{ir_t}$	5.89*	0.000	-	-
$\boldsymbol{er_t}$	4.27*	0.000	-	-
$\boldsymbol{cr_t}$	1.90	0.33	2.89**	0.049

*Significant at 1%level of significance, **significant at 5% level of significance

Since our data had both the I (0) and I(1) order and none of the variable is of order I(2). So it is better to go through the ARDL techniques of estimation. Following Pesaran *et al.*(2001), ARDL approach is adopted to estimate the weights if the MCI. The choice of the technique has been taken because the model yields the consistent estimate of the normal long-run coefficients irrespective of whether the underlying regressors are stationary at I(1) or I(o) or a mixture of both. Actually, the same issue is with our data having a mixture of order of integration, so we are proceeding with the ARDL model. Therefore, the ARDL format of the equation (III) can be as follows:

$$\pi_{t=}\ \delta_0 + \delta_1 ir_t + \delta_1 er_t + \delta_1 cr_t + \sum_{i=1}^{m} \beta_{1i}\, \Delta\pi_{t-i} + \sum_{i=1}^{n} \beta_{2i} \Delta ir_{t-i} + \sum_{i=1}^{o} \beta_{3i} er_{t-i} + \sum_{i=1}^{p} \beta_{4i} cr_{t-i} + \mu_t \qquad \text{(IV)}$$

Where the symbols in addition mentioned above have particular meanings, such as*t-1* is lag one (previous quarter),Δ, is the difference operator, m, n, o, p are the lag lengths.

The estimated equation is as following:

$$\pi_{t=}\ 1.12\, \pi_{t-1} - 0.08 ir_t + 0.04 cr_{t-2} - 0.09 er_t$$

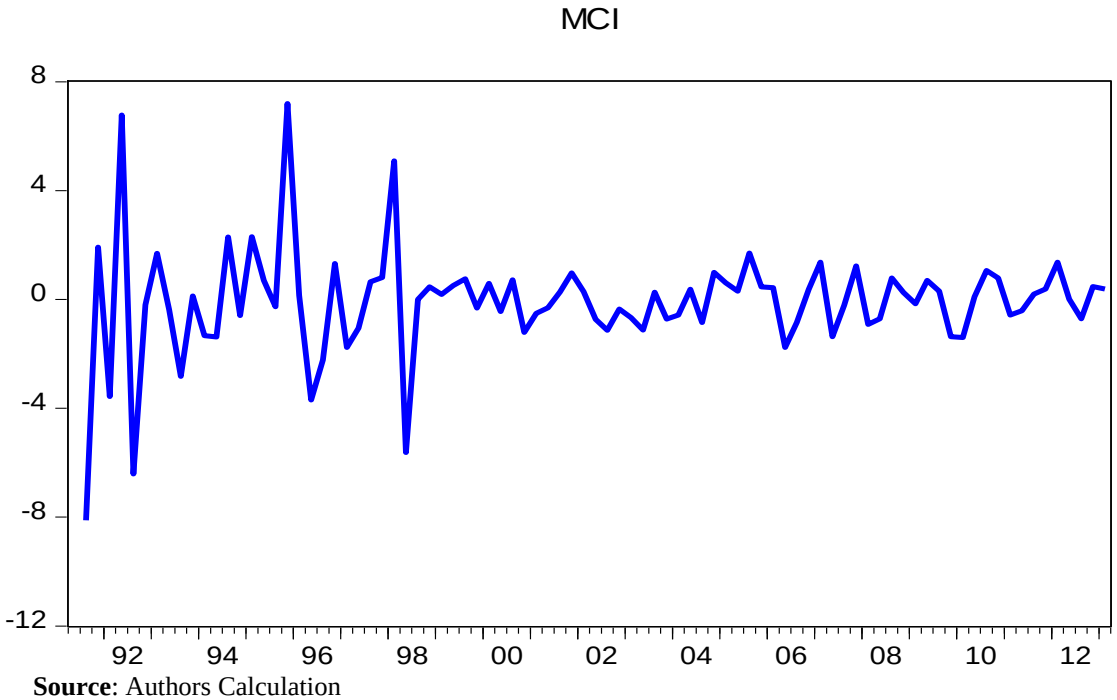
$$(9.85)^{*} \quad (-2.07)^{**} \quad (-3.23)^{**} \quad (2.54)^{**}$$

Here the values in brackets shows the t-statistics, and the * shows the t-statistics significant ta 1 percent level and ** the t-statistics significant at 5 percent level

Adjusted $\mathbf{R^2}$ **= .91065**, Durbin-Watson Stat**.= 1.96**, F Statistics= **48.47**

So the weightages from the estimated coefficients of the respective variables are calculated as;

Figure 6.1: Monetary Condition Index from 1991Q2 to 2013Q1



Source: Authors Calculation

Here from the above figure 6.1, it is clear that in the post-reform period there have been three shifts in the inflation, one was with high inflation period in the early reform period which was up to mid-90's (1995-96), following the reform package and different tools to come back from the crisis and so inflation. This lead to the 2nd phase of Indian economy with a stable inflation rate, and it seems that the inflation was in control and hence a policy control on the macroeconomic variables in general and inflation in particular. But the picture seems to be looking fade after the 2003-04 when the price stability became the cause of concern. On the other hand, the monetary condition if however an important factor responsible for explaining the inflation has remained stable after 1997-98. However here it is important to note that it is the same period when the RBI makes a shift in monetary policy from broad money indicator approach to multiple indicator approach. Then there must raise the question of co-ordination between the indicators and instruments of the monetary policy. Or we can say that with the shift in monetary policy there is stability in the monetary condition (targeted variables), but the ultimate goal of the monetary policy is going away and away.

However this is one side of the story, and definitely, it seems incomplete without going through into the policy instruments. What was the pattern of policy instruments in the post-reform period, how they have changed vis-à-vis with its objectives and how they are effective and successful in attaining its predetermined objectives?

6.3 Monetary Policy Instruments

The operating procedure of monetary policy in India has undergone a significant transformation during the post-reform period in consonance with evolving and a paradigm shift in the structure of the economy. During the 1980's and early 1990's, India followed a monetary targeting framework under which broad money was used as a target for monetary policy. However, financial developments following the reforms introduced after the balance of payment (BOP)crisis of 1991 made monetary demand unstable, which made the control of monetary aggregates difficult. In this backdrop, monetary policy management in terms of objectives, framework and instruments have undergone significant changes, reflecting a transition from a regulated to market based economy broadly. It is since April 1998, the RBI has formally adopted the "multiplier indicator approach" in which information on interest

rates, monetary aggregates, credit flows, inflation, exchange rate, etc. are pooled together for drawing the policy perspective(Mohanty,2012). Historically, RBI employed a range of policy instruments from time to time in order to capture the structural and institutional shifts for fulfilling its objectives. Monetary policy instruments in India can be classified according to the area of their strongest initial impact, i.e. whether they operate principally on the supply of money, through changes either in the base money, or the demand for credit through cost and other influences[Singh, Shetty and Venkatachalam 1982]. The range of monetary policy instruments is wide, encompassing both direct (quantity) and indirect (price) approaches (Joshi, V and I M D Little, 1996).The main instruments that the RBI used to implement the monetary policy during our period of study include:

Cash reserve Ratio: Cash reserve ratio is considered a tax on intermediation that constraints growth of liquidity in the system. The traditional arguments in favour of CRR have been that, it improves the precision in the conduct of monetary policy, used to implement the policy changes, facilitates the payment and settlement process (Hardy 1997). However, the efficacy of the CRR as an instrument has been limited as its impact is more enduring and is not quickly reversible.It is expensive to administer frequent changes in reserve requirements and "using reserve requirement to fine tune the money supply is like trying to use a jackhammer to cut diamond"(Mishkin, 1997).

However in India during the post-reform period despite the adaptation of multiple indicator approach, the CRR with its predictable impact has been one of the most effective and anti-inflationary tools. That is why it has frequently been used in the times of inflation or otherwise. The RBI which was earlier empowered to impose and alter CRR anywhere between 3 % to 15% of the net demand and time liabilities (NDTL) has been given the flexibility to fix CRR without any ceiling rate as per RBI (Amendment) Act, 2006. Pursuing its medium-term objectives, the RBI effectively varied the CRR to influence the level of bank reserves and control over money supply, an important determinant of inflation(Friedman, 1968). It served as an important guidepost for the monetary policy. Currently, the CRR is 4%[5].

Statutory Liquidity Ratio: Central banks in many countries have resorted to stipulating liquid assets requirements in addition to cash reserve requirements.

[5] CRR is 4% w.e.f 9/02/2013 announced on 29/01/2013 decreased from 4.25% which was continuing since 30/10/2012

Commercial banks are generally required to hold these liquid assets such as government securities against their deposit liabilities, which are commonly known as supplementary reserve requirements or secondary reserve requirement. In a regulated economy and in the absence of well-defined securities market, the SLR mechanism provides a captive market for government securities while simultaneously restricting the flow of credit for the commercial purposes, thus mitigating the prospects of unbridled monetary expansion. Historically the objective of SLR was to impose some financial discipline on banks and provide some protection to depositors (RBI 1985).SLR was first imposed in 1949 and was fixed at 20%. Then there has been some changes and reaching a peak in 1993 to 38.25% and currently stands at 21.50%[6]. Hence the efficacy of SLR as a monetary instrument to meet policy objectives is limited.

Bank Rate: Bank rate is essentially the rate at which funds are available from the central bank and have a bearing on the cost of credit. Changes in the bank rate tend to have a dual impact on the interest rates viz, the direct signalling impact and the indirect liquidity effect. While the changes in the bank rate per se are reflective of a shift in the stance of policy and convey a message about the central bank's assessment of monetary conditions, they have a direct effect on the cost of liquidity from the central bank, which in turn would have an impact on overall interest rate ((Indranil Bhattacharyya, Rudra Sensarma b,, 2008). It is also important from the central bank's point of view, to perform the function of lender of last resort through bank rate particularly in the wake of banking crises. Sometimes bank rate makes it harder to control money supply; as such changes often entail large fluctuations in the spread between market interest rate and bank rate leading to large unintended fluctuations in the money supply (Goodfriend and King, 1988).

In the Indian context, the RBI buys or rediscounts bills of exchange or other commercial papers eligible for the purchase at the bank rate. It influences the cost of refinancing and other financial accommodation extended to commercial banks, other specified groups of institutions and government. However, the efficacy of the bank rate depends on essentially upon commercial banks reliance on the Reserve Ranks for

[6]The current SLR rate w.ef 07/02/2015 announced on 03/02//2015, decreased from 22% which was continuing since 09/08/2015

funds and influence on other interest rates (RBI 1996-97). Bank rate which was historically aligned with the short-term interest rates was fixed 3.5% in 1935, and after a few occasional changes, it was increased to 12% in 1991. An extremely significant measure during mid 90's was the reactivation of bank rate in 1997 and was sharply used between 1998 to 2003, with the rate varying from 11% in April 1997 to 6% in April 2003. After the reactivation of bank rate, initially, it was linked it to all other rates including Reserve Banks finance rates. However, the bank rate began to lose its significance, as the monetary policy signalling was done through the modulation in the reverse repo rate and repo rate under the liquidity adjustment facility (LAF). But in February 2012, as a part of money market operation, the RBI aligned the bank rate with the marginal standing facility, which in turn is linked with policy repo rate under LAF. Currently the bank rate 7.75%[7].

Open Market Operations: Open market operations (OMO) are widely used in many industrial countries to manage short-term liquidity and have even become even more important in developing countries in their transitional phase towards the deregulation and greater market orientation(Axilrod, 1997).Central banks use OMO as a key instrument in managing liquidity conditions in the system. The advantage of OMO is that it is precise and flexible and can be targeted at a specific segment of the financial market and is easily reversible. Thus, the lags of monetary policy operations are considerably reduced through OMO (Mishkin, 1997).

In the Indian context with the progressive phasing out of the administered interest rate structure and the evaluation of regime of market determined interest rate on government securities, OMO's has gained ground and emerged as an important tool for liquidity management. OMO's have come into sharper focus since 1995-96 and in 1998099 treasury bills of varying maturities were included in OMO. OMO include both outright transactions in government securities as well as repo/ reverse repo operations under the LAF. On account of large capital inflow, RBI is conducting a series of open market sales to absorb the excess liquidity to maintain interest rates at reasonable levels.

[7] 7.75% bank rate is w.e.f 29/09/2015, decreased from 8.25% which was continuing since 02/06/2015.

Liquidity Adjustment Facility: LAF introduced in June 2000, consists of daily infusion or absorption of liquidity on a repurchase basis, through repo (liquidity injection) and reverse repo (liquidity absorption) auction operations using government securities as collateral. Repo or repurchase agreements are contracts for the sale and purchase of securities and short-term treasury bills at a future date. In this transaction, the seller repurchases the financial asset at the same rate at which it was sold and pays interest on it (Kaushik.Basu and Annemie Maertens, 2012). In short repo is short term interest bearing loan against the collateral of government securities (An Interim Liquidity Adjustment Facility (ILAF) was introduced in April 1999, which was gradually converted into full-fledged LAF from June 5, 2000, in phases. The LAF was operated through overnight fixed rate repo and reverse repo from November 2004, which provided ab informal corridor for the call money rate. However, there are two major drawbacks, one lack of single policy rate and second lack of formal corridor. To overcome these shortcoming, a new producer for the LAF was put in place in May 2011(Manoel Pacheco and Priyanka Shiraly, 2014) In fact in India, the repo rate is considered an interest rate signal from the RBI and repo per se in a monetary stabilization mechanism that central banks uses as a daily liquidity management tool. The repo can be any duration between one to 14 days or even longer but are most commonly overnight loans. One direct result of the emergence of the repo rate as the main signal rate is the diminishing importance of tee bank rate.

In the below table we will summarise the descriptive statistics of monetary policy instruments vis-à-vis its ultimate goal of price stability in the post-reform period. However, we have divided the period into three sub-period in accordance with the nature of inflation as discussed in the introductory chapter of the study.

Table 6.2: Frequency of Monetary policy Instruments

Year	Bank Rate		CRR		SLR	REPO		Reverse Repo		
	No. of times	Range (%)	No. of times	Range (%)	No. of times	Range (%)	No. of times	Range (%)	No. of times	Range (%)
1990-91 to 1995-96	2	10-12	8	14-15	10	31.5-38.50	-	-	-	-
1996-97 to 2003-04	15	6-12	30	4.50-14.50			8	6- 9	6	4.50 - 6.75
2006-07 to 2012-13	4	6- 9.50	28	4- 9	4	23-25	32	4.75-9	26	4-8

Source: Calculated from the Monetary Policy Documents (RBI)

*Repo rate in this period is considered from April 2001 because it has been started from the same period.

Here the above table seems to provide the mixed information with regard to policy variables, and concluding with respect to policy effectiveness seems immature. However, from the preliminary of the table, it is clear that the monetary policy has been continually used to tackle the problem of price instability in the recent periods than in early reform period. However, the use of policy instruments in the mid-period had been used continuously, and all instruments had led to a dramatic decline in their respective rates. It is because of the fact that economy was in stable condition along with price stability. Now is it decline in policy rates that had led to loose monetary policy and hence the inflation, if it is that then despite continuously making changes in monetary policy price instability remains the concern.

To argue either the monetary policy is effective only by preliminary overview of the policy changes is again a vague argument, because in this traditional approach to judging the credibility of monetary policy is immaturity. The fact is that here we are taking into account the changes in monetary policy signals, derived from the governor's policy statements. But what is more important is the growth of 'broad money' (M_3) and 'call money rates.[8] Then it is the combination of growth of M_3 along with the call money rate governor's policy statements that will suitability reveal the

[8]The importance of M_3 increased more since the RBI adopted the "multiple indicator approach" and also the money supply is considered as one of the major determinants of the inflation in general. And also the liquidity management operation, the RBI aims at maintaining the' interbank' "call money rates "with the repo corridor under LAF.

overall monetary policy stance. Hence to accommodate all the three into a single, we also make an attempt to make another index namely "monetary policy index" that will capture the impact of all the instruments.

6.4 Monetary Policy Index

Following S. Amaresh (2009), based on the based on the methodological footing of UNDP's computation of Human Development Index (HDI), Gender Development Index (GDI), and others[9]. In the same way, the "Monetary Policy Index" (MPI) is constructed by summing three sub-indices each sub-index is computed by the following formula:

$$\boldsymbol{SI_i} = {}^{(\boldsymbol{A_i} - \boldsymbol{x_i})}\Big/_{(\boldsymbol{X_i} - \boldsymbol{x_i})} \qquad \textbf{(I)}$$

Where $\boldsymbol{A_i}$ is the actual value of the indicator "$\boldsymbol{i}$", $\boldsymbol{x_i}$minimum value of the indicator"$\boldsymbol{i}$", $\boldsymbol{X_i}$is the maximum value of the indicator "$\boldsymbol{i}$",

From the formula (I) it is important to note that the value of sub-index lies between 0 and 1. Starting from the sub-index derived from the RBI governor's policy statement, denoted by $\boldsymbol{SI_i}$ - an interpretation of 1, 0 and -1 as expansionary, neutral and contractionary respectively.

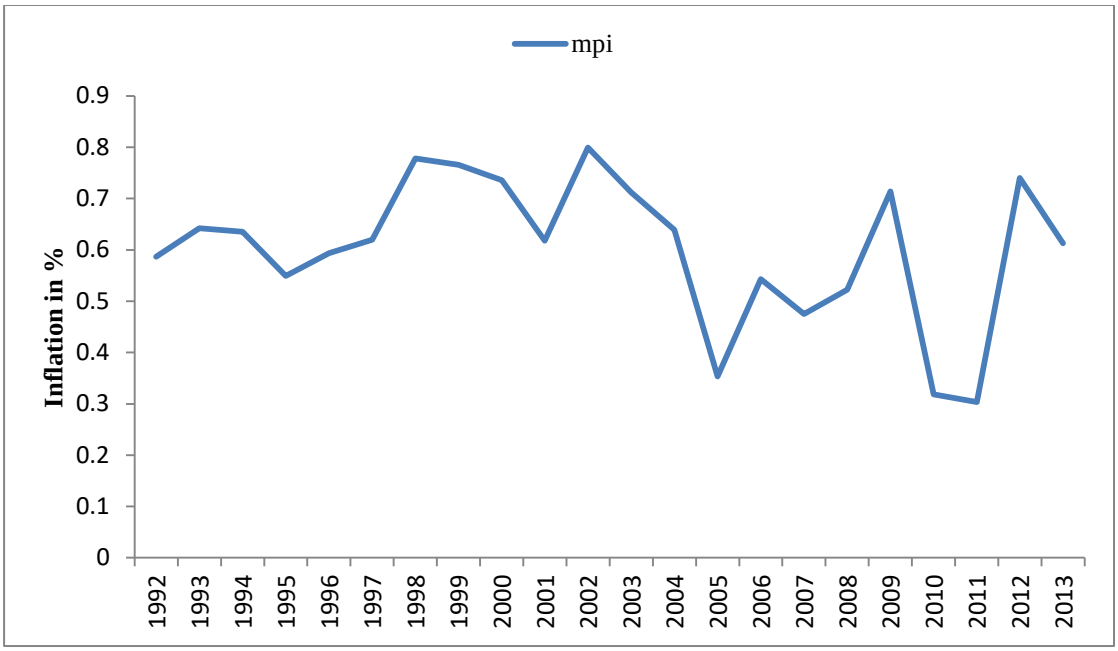
$\boldsymbol{SI_1}$is obtained from the formula (I), where $\boldsymbol{x_1}$**= -1,** $\boldsymbol{X_1}$= 1 and $\boldsymbol{A_1}$ for the particular month takes the value as per the interpretation of expansionary/neural/contractionary as discussed above. For the second sub index denoted as $\boldsymbol{SI_2}$is based on year-on-year broad money (M_3) growth for a particular month. For the computation of$\boldsymbol{SI_2}$, we have used $\boldsymbol{x_2}$=11.24(lowest M_3 growth rate during the sample period) and $\boldsymbol{X_2}$=24.00 **(**highest M_3 growth rate during the sample period) and $\boldsymbol{A_2}$ is equal to monthly actual growth rate. And finally for the computation of$\boldsymbol{SI_3}$, i.e. is the third sub index we have used $\boldsymbol{x_3}$=0.73 (lowest call money rate during the sample period) and $\boldsymbol{X_3}$=35.29 **(**highest call money rate during the sample period) and $\boldsymbol{A_3}$takes the value equal to call money rate for a particular month. Combining these three sub-indices, monetary policy index is computed as:

[9]For details visit http://www.in.undp.org/

$$MPI = {}^{1}/_{2}\,(SI_1) + 1/4(SI_2) + 1/4(1 - SI_3) \qquad \textbf{(II)}$$

By construction, the value of MOI would lie between '0' and '1'. A higher value of MPI indicates monetary expansion, while lower value indicates tight monetary policy.

Figure 6.2: Monetary Policy Index from 1992 to 2013



Source: Authors Estimation

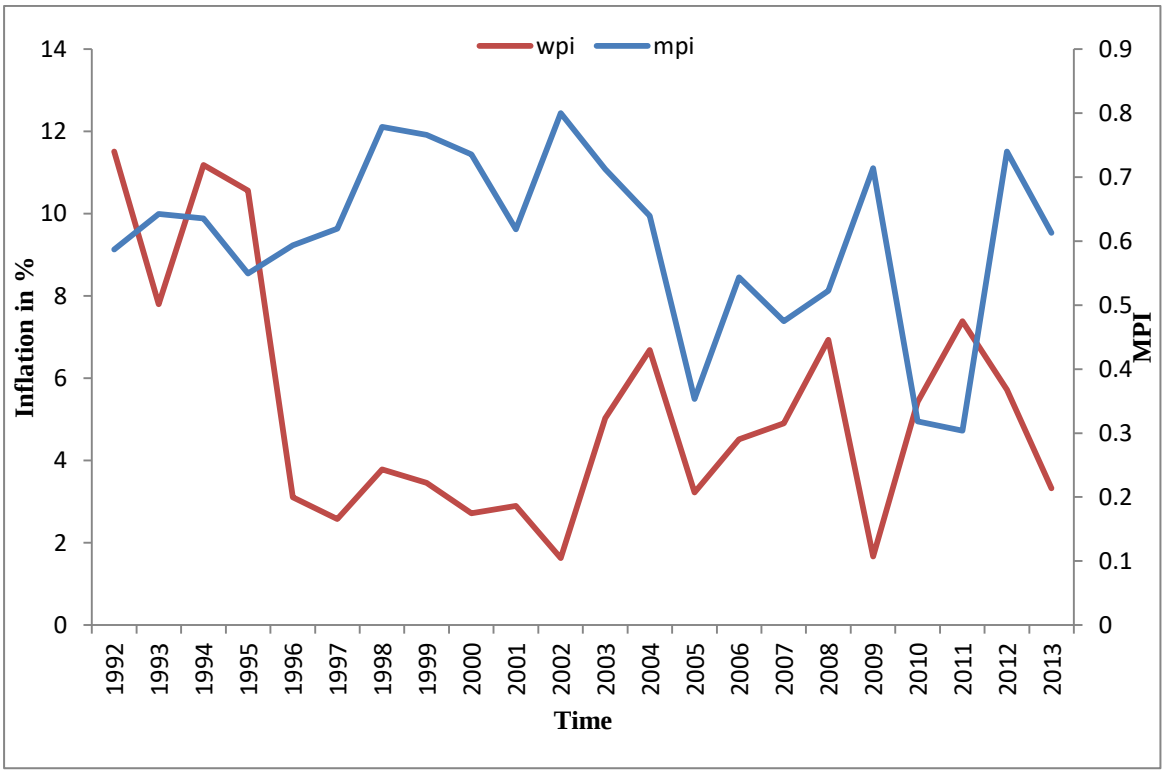
From the MPI estimated shown in figure 6.2 that there is continuous change in the monetary policy index over the period of time. From the fig we cannot make some conclusive results with respect to its effectiveness; however one thing is clear from the fig that whenever there is the problem of inflation in the economy, the policy makers are making an attempt to tight the monetary policy as is evident from 2010 on onwards. Also, it seems logical that it was the tight monetary policy in the early reform period that helped Indian economy to escape from the problem of inflation in general. But arguing this seems immature and it is logical only when we try to link the both.

6.5 Monetary Policy and Inflation

In order to assess the impact of monetary policy on inflation, we would like to link the monetary policy index and inflation graphically. This will help us to understand how the monetary policy and inflation are moving over the period of time.

It is because of the fact that it is the monetary policy which is supposed to have the primary responsibility for price stability in the Indian economy. Keeping this in view the RBI is moved towards the inflation targeting process. The figure 6.3 below indicates the relationship between the inflation and the monetary policy. The inflation which was high in the early reform period and latest reform period but the mid-period was stable from an inflation point of view. Indian economy whenever faces the problem of inflation, and to tackle the same monetary policy was always and is an important instrument to combat, along with other majors (however not the concern of our study). The same is depicted in the figure.

Figure 6.3: Monetary Policy Index and Inflation in India from 1992 to 2013



The momentum of the monetary policy index so the monetary policy is according to the expectations up to 2006 and it is after that the movement has broken down. Initially, the inflation was high, and it is a tight monetary policy, so the MPI is moving towards 1 that helps the Indian economy to overcome from the problem. And it is up to 2002 the monetary policy was tight, and this tightness led to low inflation in the mid part of reform period. But after 2006 the process goes otherwise, in the sense that was the policy should be tight and hence the low inflation, but the result shows

the opposite. This changing pattern of the movement has created the challenges especially for policymakers as to how to overcome this. But the fact is that there is something going in the back of the screen, that lead this dramatic shift and so we can say the policy is a failure.

6.6 Conclusion

Price stability and hence controlling the inflation is considered as the primary objective of the monetary policy. In order to attain its primary objective, the monetary policy uses its various instruments that help it to achieve its goal. But as we know from the analysis of the chapter that there has been a dramatic shift in recent period in the determinants of inflation. This shift is either in food inflation, fuel prices, or money supply, however, all the three are major determinants of inflation. Is it the compositional shift of food inflation and insignificance of money supply to cause food inflation, or is it the issue of fuel prices which are more within the bracket of fiscal than monetary or is it the dramatic shift in the determinants of money supply where the economy is throwing the control in the hands of another economy (via dollar colonization). Given the dramatic shift in the major determinants of inflation, we try to understand the nature and pattern of monetary policy in the same period. We try to understand the same by estimating the monetary condition index and monetary policy index and from the monetary condition index the results have shown that there is stability in the monetary condition after the adoption of multiple indicator approach and hence a positive sign from policy point of view and hence rejects any major impact or association with inflation. But in the case of monetary condition index that has its association with the inflation shows that the association and impact are as per expectations up to 2006, and after that, it has lost its momentum. The reason is clear that there is a dramatic shift in the determinants of the inflation and mentioned above and thoroughly discussed in the previous chapters, so the need of the hour is to make a change in accordance with changing nature of price-determining factors. This will help us to tackle problem high and unpredictable inflation rates.

CHAPTER 7

Conclusion and Policy Prescriptions

Inflation poses a serious threat to the growth momentum of the economy. Whatever be the cause of inflation the fact is that the inflation is something which needs to be tackled with great urgency. Given its adverse effects generally on all macroeconomic variables and the growth in particular inflation has emerged as a leading concern of policy makers. However, inflation is a common phenomenon and well-researched topic. Numerous studies have been done in India not only in the post-reform period but also in the pre-reform period as well to understand inflation. Consequently the factors that primarily affect or have been affected by inflation are well known. But the real fact is that understanding the inflationary process is still incomplete. It is mainly because of the fact that, given the complex and complicated nature of inflation that perplexes everyone in the economic system especially those on the receiving end. Given its complicated nature, the policymakers face a daunting task of controlling inflation. Studies of Pradhan and Subramanian (1998) and Callen and Chabg (1999), Bhattacharya and Sharma(1985), Singh (1989), Balakrishnan(1992), Patnaik (2010), Rakshit (2011) and many others are have tried estimate and understand the inflationary processes in India and its determinants. Understanding the process of inflation either through the prism of monetarists or Keynesian or Structuralists seems not a viable solution to the problem. Because either accepting or rejecting any of the above hypothesis does not provide an eagle eye for policy makers to provide a solution for the everlasting problem. The fact is that the series of reform measures implemented since 1991; the period in which economy witnessed a major institutional and structural change compared with the pre-reform period. The economy is now much more market oriented and government control over production, investment, trade and other economic activities are significantly less, and integration of domestic and international economy is much greater. In the process of structural reforms, factors driving the macro behaviour of the economy and the problems which policy makers are facing have undergone significant changes. In this scenario, the inflation is not an exception. But what is more unfortunate is that, as per our knowledge none of the studies analysed the changing nature of the inflation determining factors and their compositional shift. As is evident from the majority of

the studies, the major factors responsible for the inflation are money supply, food prices, import prices, etc. not only in the post-reform period but since early 1950,s. If these are really the culprits behind the cruel inflation time and again, tight monetary policy should make the price stability in the economy. In the same way, the abundance of food production in the economy should have lowered the food prices. But the results are somewhat different as we have seen in the economy especially from the last few years. We can say the policy makers are facing a situation of policy failure rather policy paralysis with respect to capturing inflation within a reasonable range despite the continuous changes in policy instruments proposed for controlling inflation. The hypothesis on which our study is mainly based is that there is the compositional shift in the inflation determining factors in the post-reform period. And our concern was to understand the shift in major inflation determining factors and through that to explain the situation of policy failure.

Given the core objective of the study, we have divided the whole thesis into seven chapters including introduction and conclusion of the study. In the first chapter, we have contextualised the research problem along with brief literature review, objectives of the study, methodology and data sources as well.

The second chapter begins with the reviewing of the basic problem i.e. the definitional aspect of the inflation; however, till date no firm and universally acceptable definition of the inflation exists. Also, a revision of types of inflation has been made as well. We also try to have a focus on the different measuremental instruments of inflation and also their limitations. We make an overview of the different schools of thought ranging from Classical's to the present New Political Macroeconomics and their way of interpreting the inflation and inflation determinants.

The classical theory of price determination, generally called as quantity theory of money, states that the money supply is the main reason for the price rise in the economy. More generally it is shown by the equation, **MV= PY**, where **M** is money stock and it is supplied by the authority, so it is exogenous. **V** is the velocity of money and represents the average number of times a unit of money is used to finance/conduct transactions. **P** represents the general price level, and **Y** is the real aggregate income in the economy. Assuming V and **Y** as constant in the short run, increase in money

supply brings direct and proportional change in prices**.** Keynesian economists normally put emphasis on the role of "aggregate demand" in the economy in determining inflation. For them, the supply of real money is merely one determinant of aggregate demand. So they think that money supply is a major determinant, but it is not the only, source of inflation. Keynesian economists have proposed three types of theories, the demand-pull, the cost-push inflation and built-in inflation for explaining the behaviour of prices. Keynesian believes that any excess demand in an economy will cause inflation. This excess demand can be created by an expansionary fiscal policy, by monetary growth, and higher spending by economic agents in national and international markets.

The monetary-school, led by Milton Friedman identified inflation as a monetary phenomenon, and that the increase in money supply was the main reason for the increase of the prices. Friedman suggested that to raise the interest rates and reduce the money supply has an effective treatment for inflation. In this chapter the Structuralists view on inflation has also been reviewed. The Structuralists essentially relate the inflation process to a special set of structural constraints faced by each economy. In their distributional mechanism, the Structuralists assumed that the changes in economic structure induce changes in relative prices, which in turn lead to changes in the general price level. Hence, the structural bottlenecks and basic rigidities in an economy cause the phenomenon of rising prices. To the Structuralists, it is growth through which the structural bottlenecks and basic rigidities of the economy can be removed and consequently the line of operation can only cure inflation in developing economies. Finally, the new idea and thought of understanding the macroeconomics variables in general and inflation in particular is incorporating the influence of political system into economy thereby giving rise to the so-called "new political macroeconomic" based on some insights from game theory and the theory of public choice These studies are interested in understanding the impact of the interaction between the economic and political systems and macroeconomic variables such as inflation, employment and output.

In Chapter third, our concern was to understand the nature and compositional pattern of food prices. Food commodities despite having a very low share in the wholesale price index their contribution in the general price level is very high especially in the recent years. Any shock will have a much longer impact on inflation,

as there is a close association between the food prices and general price level, especially in the post-reform period. Furthermore, food inflation is composed of many components, and in the post-reform period, it has been found that there has been a dramatic shift in the compositional pattern of food inflation index. As from the analysis, it has been found that this shift has occurred in the form of protein-rich components which have contributed a lot in the food inflation despite having low share in the index. Finally, we try to estimate what actually is the major factor responsible for the food prices. Using Toda-Yamamoto (1995) test, we come up with an interesting result that input cost index (ICI) and the exchange rate (ER) are having significant causality while as the money supply is of having insignificant and this insignificance of money supply have significant policy implication.

The chapter fourth of the thesis is concerned to understand the fuel price dynamics, given its major role in the determination of general price level over the period of time in general and from the last few years in particular. Following the price building mechanism, then try to focus on the compositional and fiscal scenario of fuel price commodities. From the compositional analysis, it has been found that the gap between the domestic production and consumption is continuously increasing and hence a dependence on the imports is increasing. But the other side of the coin is somehow perplexing that the share of exports to the total exports is continuously increasing, from meagre 0.27% in 1990-91 to almost 21% in 2013-14, and also the fiscal scenario reveals that it serves as a gold hen for the government. Also, the revenue is continuously increasing while as the subsidies as a percentage share of total revenue and hence as a percentage share of petroleum product revenue is drastically declining. Based on the recommendation of various committees adopted phased wise deregulation of fuel prices, and this deregulation has led to increasing in the volatility of the fuel prices and hence the general prices. Given the huge dependence on the imports and completely deregulating the fuel prices along with taking away subsidies seems not feasible for an economy like India. It seems that government is not willing to cut down the tax rates but is ready to have more and more burden on the common man

The fifth chapter of the thesis has been devoted to the money supply and its determinants. Based on the money multiplier we have made an estimate and found that two major determinants of money supply are ’m’ and ‘H’ as determined by the

money multiplier theory. However, the change in money supply is dominated by the change in 'H'. Now in due course, we try to understand the proximate determinants of m and 'H' and ultimate determinants of money supply in the sample period. In the case of m it is found that in the post-reform era the nature of proximate determinants have changed significantly if not of all the three i.e. c, t, r. The significant change in the nature of 't' (time-deposit ratio) as its role in determining' (money-multiplier) has significantly increased because of two major reasons; one higher interest rates on the time deposits and the greater awareness regarding portfolio adjustments brought about by financial deepening and diversification and other two have also changed their character if however not significantly. While as in the case of 'H' significant shift has been seen in net RBI credit to government and net foreign exchange assets of the RBI. The building-up of foreign currency reserves (dollars) lead to an expansion of money supply in domestic economy.

Finally, the chapter sixth of the study reports the results of, how effective had been monetary policy and what changes have been made in due course of time to tackle the problem. For that pursue we estimated two indices one is monetary condition index and other is monetary policy index. The important and interesting result to note down is that the monetary conditions have been stabilised after the adoption of multiplier indicator approach and hence a stable momentary condition is the signal of positive policy and economic system. The same story goes with the monetary policy index as the inflation was the monetary condition index seems to be tightened to control the inflation. But the index and hence the monetary policy has lost its momentum in the recent surge of inflation and its major cause is the compositional shift in the inflation determinants that has not been taken into account.

7.1: Major Findings

- There is a dramatic compositional shift in the components of food inflation. Factors having higher weightage are contributing less in the food inflation while those having lesser weightage in the food price index are contributing a lot. This dramatic shift must have policy implications, and that may be the one major reason that the policy framing is unable to cope up with the surging of food inflation.

- In determining food inflation input cost index (ICI), the exchange rate (ER) is having significant causality while as the money supply is of having insignificant.
- The fuel commodities are serving as the gold hen for the government, as the government is earning huge amount of revenue from them.
- The deregulation of fuel prices has led to increase in instability of fuel prices and hence general price level. Given the scenario of fuel commodities sector, it seems illogical to go for both the complete deregulation and taking away the subsidies when more than 80% of the demand is fulfilled by imports.
- The fuel prices are more a fiscal policy issue than a monetary policy issue and the controlling inflation only through monetary policy is not a viable solution.
- In the case of money supply one of the evergreen determinants of inflation; it has been found that the determinants of the money supply by itself have gone through a dramatic shift. In the case of' the proportion of time deposits have increased and hence a positive signal for the financial health of the economy, but what is pinching is the compositional shift in the determinants of 'H' where the dollar colonisation is going to throw away the policy from the hands of policy makers.
- Given the dramatic compositional shift in the proximate determinants of inflation, the monetary policy has been changed in due course to catch up the inflation. This monetary policy has trailed since 2006 when the new surge of inflation has occurred in the post-reform period. The major reason for this derailing seems the compositional shift in the determinants of inflation.

7.2: Policy Prescriptions:

- RBI should develop such an index of price measurement which should overcome all the major limitations of the existing indices, by accommodating the quality and quantity changes of all important products, so that it reflects real changes in cost of living of households.
- As in the case of food price the share of protein rich components is increasing over the period of time, so there is need of reexamining the weightage of different items in the index of price measurement accordingly.

- As food inflation is mainly supply side problem, there is a need to make use technology to reduce the cost of production and increase the supply of necessory food items in which we are not self sufficient. Along with that inefficiency of supply chain system is another big problem in this direction, which need to be strengthen. In all these endevours monetary policy have very limited role and role of Government through fiscal polcy is very important.
- The deregulation of fuel prices has led to increase instability in the fuel prices and through that to the general prices. Having more than 80% of dependence on imports, deregulating the fuel prices is illogical. Hence it is recommonded to role back the present complete deregulation policy of fuel prices, which is based on Parikh committee report. For ensuring the financial health of oil companies Government need to review its tax policy of fuel products.
- There is also need to develop alternative sources of energy like wind and solar energy, so that in future we can reduce our dependence on petroleum products for our energy requirement.
- As in the post reform period, role of foreign exchange reserve is increasing in deciding the value of H, which is an external factor and could not be controlled by policy maker. In this context, only thing which could be done to strengthen the internal money supply management system, and for that purpose Government security market need to be developed, which is still in its infancy stage.
- There is also need to develop banking technology like the e-banking, plastic money, ATM, mobile banking etc. at the grass root level, particularly in rural areas to strengthen the control of RBI on money supply, as these factors are major determinants of money multiplier (m) and by which black money can also be controlled.
- Given the compositional shift in the determinants of inflation, there is a need to consider these shifts in designing of monetary policy to make it effective in controlling inflation.

7.3: Limitations of the Study

Our study comes up with some important findings, but much remains to be done. And also the fact is that along with the findings we have posed the questions that remained unanswered however very important, in order to understand the phenomenon thoroughly. Although these posed questions is in itself a great success of the study, as they are making way for new research. The major limitations of the study areas:

- In understanding the nature and pattern of determinants of inflation we were unable to take into account the important factors that are the structural factors. The fact that the structural factors are playing an important role in declining prices either in the form of transport or in the form of good storage facilities. For example, on the one side, some states have an abundance of food grains and other are unable get two-time meals, in the abundant states the prices are so low in that farmers, are not willing to sell their produce, and in other states, prices are so high that common man is unable to buy the same commodity. If there would have been well-developed infrastructure and transport facility, then the bias, as well as the price rise, would have been in control. However, we could not consider the same factor into our study because of non-availability of the data set.
- Another important factor, especially in the Indian context, is that had not been included in the study are non-economic factors e.g. caste, religion, culture etc. As we know in the Indian context, the division of land is based on the basis of caste that too is with unfair distribution. That lead to the phenomenon that those who want to work don't have land those who have land does not work and their lands remains barren. Hence causes a major loss of the production and productivity of the economy. This factor also has not been taken into account because of non-availability of data set.
- Hoarding and corruption (black economy) are also the important factors playing its role and are in debate in all walks of life, but the biggest challenge for taking them into account is again the problem of the data set.
- The ultimate determinants of money supply c, r, t are ultimately determined by behavioural factors and these behavioural factors haven't been taken into account because of non-availability relevant and accurate data set.
- Finally, this study done in case of India may not have universal applicability

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APPENDICES

Table 3.1 Derivation of Input cost index

Time	WPI	Fert.	Tract.	Light diesel	Agr Eletrc	HSD	Fodder	Lubri	Cattle Feed	Fert.	Tract.	Light diesel	Agr Eletrc	HSD	Fodder	Lubri	cattle feed	ICI
Weightage	100.00	3.15	0.41	0.12	0.85	4.67	0.25	0.17	0.11	32.38	4.18	1.23	8.72	48.07	2.54	1.73	1.15	
Apr-91	41.57	35.00	48.57	19.15	24.18	22.12	69.22	32.63	43.50	1345.97	146.30	59.50	166.98	1162.32	56.24	119.71	37.62	30.95
May-91	42.00	35.00	49.03	19.15	24.18	22.12	64.54	32.63	43.50	1359.94	146.30	60.06	166.98	1162.32	56.24	111.62	37.62	31.01
Jun-91	42.78	35.14	52.98	19.15	24.18	22.12	61.54	32.63	43.50	1385.07	146.85	64.90	166.98	1162.32	56.24	106.44	37.62	31.26
Jul-91	43.73	38.20	53.76	19.61	24.18	22.12	59.93	33.45	43.55	1415.78	159.64	65.86	170.95	1162.32	56.24	103.64	38.57	31.73
Aug-91	45.11	46.63	54.32	20.96	24.18	22.12	63.09	37.26	43.74	1460.46	194.89	66.55	182.75	1162.32	56.24	109.11	42.96	32.75
Sep-91	45.37	46.63	54.51	20.96	24.43	22.12	63.47	38.16	44.61	1468.84	194.89	66.78	182.75	1174.36	56.24	109.77	44.00	32.98
Oct-91	45.33	46.63	54.70	20.96	24.81	22.12	61.33	38.16	47.33	1467.45	194.89	67.01	182.75	1192.82	56.24	106.07	44.00	33.11
Nov-91	45.80	46.63	54.97	20.96	24.93	22.12	62.99	38.16	48.49	1482.80	194.89	67.34	182.75	1198.44	56.24	108.94	44.00	33.35
Dec-91	45.97	46.63	56.53	20.96	25.00	22.12	64.25	38.16	49.08	1488.39	194.89	69.25	182.75	1201.65	56.24	111.12	44.00	33.48
Jan-92	46.42	46.66	56.64	21.16	25.00	22.65	64.97	38.63	50.11	1503.05	195.03	69.38	184.47	1201.65	57.58	112.36	44.54	33.68
Feb-92	46.66	46.73	56.64	21.16	25.00	22.65	64.94	38.66	50.67	1510.73	195.30	69.38	184.47	1201.65	57.58	112.31	44.58	33.76
Mar-92	46.94	44.22	57.79	21.16	25.90	22.65	67.86	38.66	51.00	1519.80	184.82	70.80	184.47	1245.00	57.58	117.37	44.58	34.24
Apr-92	47.31	44.22	58.12	21.16	25.90	22.65	59.07	38.66	51.16	1531.67	184.82	71.19	184.47	1245.00	57.58	102.16	44.58	34.21
May-92	47.78	44.22	58.95	21.16	26.41	22.65	51.09	38.66	51.32	1547.03	184.82	72.22	184.47	1269.88	57.58	88.36	44.58	34.49
Jun-92	48.32	44.25	59.03	21.16	26.41	22.65	53.82	38.66	51.40	1564.48	184.96	72.31	184.47	1269.88	57.58	93.08	44.58	34.71
Jul-92	48.86	43.99	59.03	21.16	26.41	22.65	59.31	38.66	51.67	1581.94	183.87	72.31	184.47	1269.88	57.58	102.57	44.58	34.97
Aug-92	49.34	47.25	59.22	21.16	26.41	22.65	58.31	38.66	51.67	1597.30	197.48	72.55	184.47	1269.88	57.58	100.85	44.58	35.25
Sep-92	49.75	60.34	60.00	24.01	26.41	25.00	57.41	43.55	51.67	1610.56	252.19	73.50	209.37	1269.88	63.57	99.29	50.21	36.29
Oct-92	50.11	60.34	60.38	26.87	26.41	27.35	57.98	48.42	53.94	1622.43	252.19	73.96	234.26	1269.88	69.55	100.27	55.83	36.78

Nov-92	49.96	60.34	60.38	26.87	26.41	27.35	59.21	48.42	54.07	1617.54	252.19	73.96	234.26	1269.88	69.55	102.41	55.83	36.76
Dec-92	49.90	60.27	60.38	26.87	26.41	27.35	61.02	48.42	54.15	1615.45	251.92	73.96	234.26	1269.88	69.55	105.53	55.83	36.76
Jan-93	49.94	59.95	60.38	26.87	28.05	27.35	62.11	48.42	54.37	1616.84	250.55	73.96	234.26	1348.55	69.55	107.42	55.83	37.57
Feb-93	50.20	59.95	60.38	26.87	30.51	27.35	60.85	49.24	54.26	1625.22	250.55	73.96	234.26	1466.55	69.55	105.25	56.78	38.82
Mar-93	50.26	59.95	58.65	26.87	30.51	27.35	59.45	51.85	54.05	1627.31	250.55	71.85	234.26	1466.55	69.55	102.82	59.78	38.83
Apr-93	50.59	59.95	58.65	26.85	32.11	27.35	55.58	52.30	54.37	1637.79	250.55	71.85	234.16	1543.61	69.55	96.12	60.30	39.64
May-93	51.10	59.95	58.65	26.85	33.69	27.35	51.40	52.32	54.37	1654.54	250.55	71.85	234.16	1619.86	69.55	88.89	60.32	40.50
Jun-93	51.71	59.95	58.63	26.85	36.07	27.35	52.92	52.32	54.37	1674.09	250.55	71.82	234.16	1733.85	69.55	91.52	60.32	41.86
Jul-93	52.42	60.11	60.00	26.85	36.85	27.35	56.98	52.32	54.77	1697.13	251.23	73.50	234.16	1771.58	69.55	98.55	60.32	42.56
Aug-93	53.26	60.11	60.00	26.85	36.85	27.35	62.38	52.32	55.07	1724.35	251.23	73.50	234.16	1771.58	69.55	107.88	60.32	42.93
Sep-93	54.10	60.14	60.00	26.85	37.40	27.35	61.40	52.32	55.29	1751.58	251.37	73.50	234.16	1798.06	69.55	106.19	60.32	43.45
Oct-93	54.38	60.11	60.29	26.85	37.79	27.35	57.96	52.32	56.66	1760.66	251.23	73.86	234.16	1816.53	69.55	100.23	60.32	43.67
Nov-93	54.25	60.11	60.40	26.85	37.79	27.35	57.69	52.32	56.47	1756.47	251.23	74.00	234.16	1816.53	69.55	99.78	60.32	43.62
Dec-93	54.27	60.11	60.54	26.85	38.65	27.35	61.80	52.32	56.31	1757.16	251.23	74.16	234.16	1858.27	69.55	106.89	60.32	44.12
Jan-94	54.49	60.11	60.73	26.85	38.65	27.35	67.27	54.41	57.31	1764.15	251.23	74.39	234.16	1858.27	69.55	116.34	62.73	44.31
Feb-94	54.94	60.11	61.42	29.92	38.65	30.25	68.24	55.79	57.25	1778.81	251.23	75.25	260.88	1858.27	76.91	118.03	64.32	44.84
Mar-94	55.55	63.37	62.18	29.92	38.67	30.25	67.13	55.79	57.23	1798.35	264.84	76.17	260.88	1859.07	76.91	116.09	64.32	45.17
Apr-94	57.49	62.23	62.29	29.92	43.06	30.22	60.96	55.29	57.42	1861.18	260.09	76.31	260.87	2070.24	76.85	105.42	63.75	47.75
May-94	57.91	62.23	63.25	29.92	43.06	30.22	56.17	53.12	57.83	1875.04	260.09	77.49	260.87	2070.24	76.85	97.14	61.25	47.79
Jun-94	58.82	68.67	64.58	29.92	43.06	30.22	56.95	52.38	58.06	1904.47	287.03	79.11	260.87	2070.24	76.85	98.49	60.39	48.37
Jul-94	59.41	72.11	65.06	29.92	43.06	30.22	61.68	53.12	57.89	1923.51	301.38	79.70	260.87	2070.24	76.85	106.67	61.25	48.80
Aug-94	59.79	71.93	65.06	29.92	43.06	30.22	60.78	53.60	58.44	1935.63	300.62	79.70	260.87	2070.24	76.85	105.11	61.80	48.91
Sep-94	59.84	72.05	65.84	29.92	43.06	30.22	62.87	53.60	58.50	1937.36	301.13	80.66	260.87	2070.24	76.85	108.74	61.80	48.98
Oct-94	60.27	72.83	66.27	29.92	43.06	30.22	66.05	55.29	58.39	1951.21	304.40	81.18	260.87	2070.24	76.85	114.23	63.75	49.23
Nov-94	60.53	73.01	66.39	29.92	43.06	30.22	67.31	55.71	58.72	1959.87	305.16	81.32	260.87	2070.24	76.85	116.40	64.24	49.35
Dec-94	61.23	73.61	66.39	29.92	43.06	30.22	71.80	55.71	61.06	1982.38	307.67	81.32	260.87	2070.24	76.85	124.17	64.24	49.68

Jan-95	62.14	74.04	66.51	29.92	43.06	30.22	72.69	55.71	62.28	2011.81	309.44	81.47	260.87	2070.24	76.85	125.72	64.24	50.01
Feb-95	62.51	73.92	67.29	29.92	43.06	30.22	72.81	55.71	63.22	2023.93	308.93	82.43	260.87	2070.24	76.85	125.93	64.24	50.13
Mar-95	62.51	74.04	67.53	29.92	43.06	30.22	72.99	55.71	63.22	2023.93	309.44	82.73	260.87	2070.24	76.85	126.24	64.24	50.15
Apr-95	63.80	75.48	68.55	29.92	49.08	30.22	65.69	55.71	63.39	2065.48	315.48	83.98	260.87	2359.40	76.85	113.61	64.24	53.40
May-95	64.28	76.99	68.80	29.89	49.08	30.22	58.44	55.34	64.56	2081.06	321.77	84.28	260.63	2359.40	76.85	101.08	63.81	53.49
Jun-95	64.55	77.59	69.04	29.89	49.08	30.22	54.07	54.23	66.89	2089.72	324.29	84.57	260.63	2359.40	76.85	93.52	62.53	53.52
Jul-95	65.13	77.89	70.54	29.89	49.08	30.22	62.75	54.23	66.89	2108.77	325.55	86.42	260.63	2359.40	76.85	108.53	62.53	53.89
Aug-95	65.13	78.13	70.84	29.89	49.08	30.22	66.53	54.23	66.89	2108.77	326.56	86.79	260.63	2359.40	76.85	115.06	62.53	53.97
Sep-95	65.19	77.17	70.96	29.89	49.08	30.22	65.69	54.23	68.39	2110.50	322.53	86.93	260.63	2359.40	76.85	113.61	62.53	53.93
Oct-95	65.35	76.51	71.27	29.89	49.08	30.22	66.95	54.23	68.78	2115.69	319.76	87.30	260.63	2359.40	76.85	115.78	62.53	53.98
Nov-95	65.51	76.93	71.75	29.89	49.08	30.22	67.01	54.23	68.78	2120.88	321.52	87.89	260.63	2359.40	76.85	115.88	62.53	54.06
Dec-95	65.29	77.23	71.51	29.89	49.08	30.22	69.40	54.23	68.83	2113.96	322.78	87.60	260.63	2359.40	76.85	120.03	62.53	54.04
Jan-96	65.24	77.17	71.93	29.89	49.08	30.22	72.87	54.23	69.22	2112.23	322.53	88.11	260.63	2359.40	76.85	126.03	62.53	54.08
Feb-96	65.29	77.41	72.17	29.89	49.08	30.22	72.93	60.95	69.44	2113.96	323.54	88.41	260.63	2359.40	76.85	126.14	70.28	54.19
Mar-96	65.35	77.41	72.17	29.89	49.08	30.22	72.75	60.90	69.44	2115.69	323.54	88.41	260.63	2359.40	76.85	125.83	70.22	54.21
Apr-96	66.15	77.17	73.13	29.89	50.48	30.22	61.44	60.95	69.39	2141.66	322.53	89.59	260.63	2426.81	76.85	106.25	70.28	54.95
May-96	66.58	77.17	73.19	29.89	50.48	30.22	54.55	60.95	69.44	2155.51	322.53	89.66	260.63	2426.81	76.85	94.34	70.28	54.97
Jun-96	66.90	77.11	73.31	29.89	50.48	30.22	61.98	60.95	72.83	2165.90	322.28	89.81	260.63	2426.81	76.85	107.19	70.28	55.20
Jul-96	67.91	76.63	75.60	38.74	50.48	34.69	67.13	62.49	73.67	2198.79	320.26	92.62	337.82	2426.81	88.22	116.09	72.05	56.53
Aug-96	68.34	76.33	77.23	38.74	50.48	34.72	70.72	63.60	73.89	2212.65	319.00	94.61	337.82	2426.81	88.29	122.31	73.33	56.75
Sep-96	68.50	76.33	77.59	38.74	50.48	34.72	78.08	63.60	74.06	2217.84	319.00	95.05	337.82	2426.81	88.29	135.04	73.33	56.93
Oct-96	68.34	76.57	78.07	38.74	50.48	34.72	78.02	63.60	78.78	2212.65	320.01	95.64	337.82	2426.81	88.29	134.94	73.33	56.89
Nov-96	68.45	76.63	78.07	38.74	50.48	34.72	83.53	63.60	78.78	2216.11	320.26	95.64	337.82	2426.81	88.29	144.47	73.33	57.03
Dec-96	68.72	76.69	78.25	38.74	50.48	34.72	86.71	63.60	80.67	2224.76	320.51	95.86	337.82	2426.81	88.29	149.96	73.33	57.17
Jan-97	68.61	76.75	78.43	38.74	50.48	34.72	83.47	63.60	81.22	2221.30	320.77	96.08	337.82	2426.81	88.29	144.36	73.33	57.09
Feb-97	68.88	77.89	78.55	38.74	50.48	34.72	89.76	63.60	81.22	2229.96	325.55	96.23	337.82	2426.81	88.29	155.24	73.33	57.33

Mar-97	68.88	81.14	80.36	38.74	50.48	34.72	91.68	65.13	81.22	2229.96	339.15	98.45	337.82	2426.81	88.29	158.55	75.10	57.54
Apr-97	70.00	80.30	80.54	38.74	54.06	34.72	92.69	64.97	81.22	2266.32	335.62	98.67	337.82	2598.89	88.29	160.31	74.91	59.61
May-97	69.95	80.54	80.78	38.74	54.06	34.72	69.70	65.13	81.56	2264.59	336.63	98.96	337.82	2598.89	88.29	120.54	75.10	59.21
Jun-97	70.27	80.48	80.78	38.74	54.06	34.72	71.56	65.13	81.67	2274.97	336.38	98.96	337.82	2598.89	88.29	123.75	75.10	59.34
Jul-97	70.37	80.48	80.90	38.74	54.06	34.72	74.13	65.13	81.67	2278.44	336.38	99.11	337.82	2598.89	88.29	128.21	75.10	59.42
Aug-97	70.59	80.48	81.93	38.74	54.06	34.72	79.04	65.13	81.67	2285.36	336.38	100.36	337.82	2598.89	88.29	136.70	75.10	59.59
Sep-97	71.07	80.54	82.53	38.74	54.06	44.44	80.36	65.13	81.67	2300.94	336.63	101.10	337.82	2598.89	113.01	138.98	75.10	60.02
Oct-97	71.34	80.90	82.71	38.74	54.06	44.61	84.79	65.13	81.67	2309.60	338.14	101.32	337.82	2598.89	113.43	146.64	75.10	60.21
Nov-97	71.18	81.27	83.31	38.74	54.06	44.25	88.44	65.13	81.67	2304.41	339.65	102.06	337.82	2598.89	112.52	152.96	75.10	60.23
Dec-97	71.50	81.33	83.31	38.74	54.06	44.25	95.99	65.13	81.67	2314.79	339.90	102.06	337.82	2598.89	112.52	166.01	75.10	60.47
Jan-98	72.09	81.33	84.04	38.74	54.06	44.25	90.00	65.13	81.67	2333.84	339.90	102.95	337.82	2598.89	112.52	155.65	75.10	60.57
Feb-98	71.76	81.33	84.04	38.74	54.06	44.22	75.93	67.35	81.67	2323.45	339.90	102.95	337.82	2598.89	112.44	131.31	77.66	60.24
Mar-98	71.87	81.33	84.34	38.74	54.06	44.25	72.81	68.10	81.67	2326.91	339.90	103.32	337.82	2598.89	112.52	125.93	78.51	60.24
Apr-98	73.21	81.27	84.34	39.84	57.75	42.81	69.28	67.62	82.17	2370.20	339.65	103.32	347.35	2776.28	108.84	119.82	77.96	62.43
May-98	73.90	81.20	84.76	40.19	57.75	42.31	67.49	68.41	83.67	2392.70	339.40	103.83	350.44	2776.28	107.57	116.71	78.88	62.66
Jun-98	74.76	81.27	84.82	40.19	57.75	42.14	60.60	68.41	85.39	2420.41	339.65	103.91	350.44	2776.28	107.15	104.80	78.88	62.82
Jul-98	75.35	81.27	84.94	40.19	58.12	42.03	62.69	68.41	87.11	2439.45	339.65	104.05	350.44	2794.02	106.86	108.43	78.88	63.22
Aug-98	75.19	81.33	85.30	40.19	58.12	42.00	66.05	68.41	87.11	2434.26	339.90	104.50	350.44	2794.02	106.79	114.23	78.88	63.23
Sep-98	75.29	81.33	85.30	40.19	58.12	42.00	68.20	68.41	87.17	2437.72	339.90	104.50	350.44	2794.02	106.79	117.96	78.88	63.30
Oct-98	75.94	81.45	85.30	40.19	58.12	42.00	69.46	68.41	87.17	2458.49	340.41	104.50	350.44	2794.02	106.79	120.13	78.88	63.54
Nov-98	76.26	81.51	85.30	40.19	58.12	42.00	75.33	68.41	87.17	2468.88	340.66	104.50	350.44	2794.02	106.79	130.28	78.88	63.74
Dec-98	75.99	81.57	84.64	40.19	58.12	42.00	76.17	68.41	87.17	2460.23	340.91	103.69	350.44	2794.02	106.79	131.73	78.88	63.67
Jan-99	75.35	82.35	85.66	36.80	58.12	38.28	69.46	68.41	87.17	2439.45	344.18	104.94	320.90	2794.02	97.33	120.13	78.88	63.00
Feb-99	75.61	84.04	87.17	35.96	57.27	37.33	73.71	70.63	88.61	2448.11	351.23	106.78	313.52	2753.22	94.93	127.48	81.44	62.77
Mar-99	75.72	84.22	87.95	35.93	56.86	40.61	70.96	71.38	89.06	2451.57	351.99	107.74	313.28	2733.71	103.26	122.72	82.29	62.67
Apr-99	76.15	84.10	88.01	35.77	56.86	40.61	55.51	71.38	91.33	2465.42	351.48	107.82	311.85	2733.71	103.26	96.00	82.29	62.52

May-99	76.36	84.16	87.83	35.77	56.86	40.75	56.23	71.38	92.11	2472.35	351.74	107.60	311.85	2733.71	103.62	97.24	82.29	62.60
Jun-99	76.63	84.10	87.83	35.98	56.86	41.33	51.14	71.38	92.44	2481.00	351.48	107.60	313.75	2733.71	105.10	88.44	82.29	62.63
Jul-99	76.84	84.04	87.89	36.61	56.86	41.33	56.83	71.38	94.67	2487.93	351.23	107.67	319.23	2733.71	105.10	98.28	82.29	62.85
Aug-99	77.33	83.92	88.07	37.38	56.86	41.33	58.08	71.38	95.17	2503.51	350.73	107.89	325.90	2733.71	105.10	100.45	82.29	63.10
Sep-99	77.70	83.80	88.13	40.00	56.86	41.67	60.78	71.38	96.06	2515.63	350.22	107.97	348.77	2733.71	105.95	105.11	82.29	63.50
Oct-99	78.56	83.86	88.19	51.37	56.86	54.11	65.45	71.38	97.56	2543.33	350.48	108.04	447.88	2733.71	137.59	113.19	82.29	65.17
Nov-99	78.61	83.92	88.61	54.64	56.86	57.33	67.96	71.38	98.78	2545.06	350.73	108.56	476.47	2733.71	145.78	117.54	82.29	65.60
Dec-99	78.13	83.92	88.80	54.67	56.86	57.33	69.52	71.38	99.44	2529.48	350.73	108.78	476.71	2733.71	145.78	120.23	82.29	65.48
Jan-00	78.02	83.86	88.67	55.25	56.86	57.33	73.23	71.38	99.28	2526.02	350.48	108.63	481.71	2733.71	145.78	126.65	82.29	65.55
Feb-00	78.29	83.86	88.43	56.23	59.63	57.33	76.35	71.38	100.61	2534.67	350.48	108.33	490.29	2866.76	145.78	132.04	82.29	67.11
Mar-00	79.95	90.84	89.34	57.95	68.01	57.36	71.20	71.38	98.44	2588.34	379.68	109.44	505.29	3269.45	145.85	123.13	82.29	72.03
Apr-00	81.12	90.96	89.40	58.42	68.01	57.75	68.38	71.38	98.44	2626.43	380.19	109.52	509.34	3269.45	146.84	118.27	82.29	72.42
May-00	81.18	91.27	89.46	58.42	68.01	57.39	56.17	71.38	98.44	2628.17	381.45	109.59	509.34	3269.45	145.92	97.14	82.29	72.23
Jun-00	81.66	92.05	89.46	58.42	68.01	57.39	51.68	73.49	97.39	2643.75	384.72	109.59	509.34	3269.45	145.92	89.37	84.73	72.37
Jul-00	81.87	92.23	89.22	58.42	68.01	57.39	49.52	74.71	96.83	2650.67	385.47	109.29	509.34	3269.45	145.92	85.64	86.14	72.42
Aug-00	82.03	92.17	89.22	58.42	69.85	57.44	50.78	75.66	97.39	2655.87	385.22	109.29	509.34	3358.15	146.07	87.82	87.24	73.39
Sep-00	82.73	92.29	90.00	58.42	75.90	59.75	51.74	76.14	96.83	2678.37	385.73	110.25	509.34	3649.08	151.93	89.48	87.78	76.62
Oct-00	84.44	92.71	91.39	68.50	75.42	69.17	59.46	76.46	96.89	2733.78	387.49	111.95	597.25	3626.02	175.87	102.84	88.15	78.23
Nov-00	84.60	93.01	91.39	68.50	76.01	69.17	64.73	76.67	97.17	2738.97	388.75	111.95	597.25	3654.41	175.87	111.95	88.39	78.68
Dec-00	84.76	93.80	91.39	68.50	76.20	69.17	74.25	76.67	98.06	2744.16	392.02	111.95	597.25	3663.28	175.87	128.42	88.39	79.01
Jan-01	84.81	93.80	91.39	68.50	78.15	69.17	81.02	76.67	98.06	2745.90	392.02	111.95	597.25	3757.30	175.87	140.12	88.39	80.09
Feb-01	84.81	93.80	91.39	68.50	78.82	69.17	82.16	78.15	97.78	2745.90	392.02	111.95	597.25	3789.23	175.87	142.09	90.10	80.44
Mar-01	85.08	93.80	93.13	68.50	78.82	69.75	82.16	78.15	97.72	2754.55	392.02	114.09	597.25	3789.23	177.35	142.09	90.10	80.57
Apr-01	85.51	94.34	93.13	68.50	78.82	69.75	77.60	78.15	97.72	2768.40	394.29	114.09	597.25	3789.23	177.35	134.21	90.10	80.65
May-01	85.72	94.46	93.25	68.50	78.82	69.75	69.88	78.15	97.72	2775.33	394.79	114.24	597.25	3789.23	177.35	120.86	90.10	80.59
Jun-01	85.99	94.46	92.83	68.50	78.82	69.75	68.62	78.15	96.67	2783.99	394.79	113.72	597.25	3789.23	177.35	118.68	90.10	80.65

Jul-01	86.15	94.46	92.89	68.50	78.82	69.75	74.67	78.15	96.72	2789.18	394.79	113.80	597.25	3789.23	177.35	129.14	90.10	80.81
Aug-01	86.47	94.64	93.25	68.17	85.90	69.75	76.59	78.15	96.83	2799.57	395.55	114.24	594.39	4129.83	177.35	132.45	90.10	84.33
Sep-01	86.47	94.64	94.10	67.84	85.90	69.75	79.46	78.10	97.22	2799.57	395.55	115.27	591.54	4129.83	177.35	137.42	90.04	84.37
Oct-01	86.90	94.76	94.10	67.84	91.55	69.75	82.51	78.10	97.22	2813.42	396.05	115.27	591.54	4401.25	177.35	142.71	90.04	87.28
Nov-01	86.79	95.24	94.10	67.13	90.55	71.31	84.91	78.10	97.22	2809.96	398.06	115.27	585.34	4353.35	181.31	146.85	90.04	86.80
Dec-01	86.52	94.94	94.10	63.96	90.55	71.83	81.56	78.10	97.11	2801.30	396.80	115.27	557.71	4353.35	182.65	141.05	90.04	86.38
Jan-02	86.10	95.18	94.10	63.96	90.55	71.14	87.01	78.10	96.83	2787.45	397.81	115.27	557.71	4353.35	180.89	150.47	90.04	86.33
Feb-02	85.99	95.18	94.10	63.96	90.55	70.42	92.57	78.10	96.67	2783.99	397.81	115.27	557.71	4353.35	179.05	160.10	90.04	86.37
Mar-02	86.58	97.47	92.29	62.40	90.55	68.14	102.10	78.10	96.67	2803.03	407.38	113.06	544.13	4353.35	173.26	176.57	90.04	86.61
Apr-02	86.79	97.89	93.07	62.70	90.55	68.19	84.31	81.48	96.67	2809.96	409.14	114.02	546.75	4353.35	173.40	145.81	93.95	86.46
May-02	87.06	97.95	93.07	62.70	90.55	68.19	70.30	81.48	96.67	2818.61	409.39	114.02	546.75	4353.35	173.40	121.58	93.95	86.31
Jun-02	88.07	98.19	93.07	62.70	90.55	73.42	74.97	81.48	96.67	2851.51	410.40	114.02	546.75	4353.35	186.68	129.66	93.95	86.86
Jul-02	88.56	98.31	93.07	62.70	94.65	75.25	82.28	81.48	97.11	2867.09	410.90	114.02	546.75	4550.27	191.34	142.29	93.95	89.17
Aug-02	89.36	98.31	93.07	62.70	94.65	73.67	97.31	81.48	98.33	2893.06	410.90	114.02	546.75	4550.27	187.31	168.29	93.95	89.65
Sep-02	89.52	98.73	93.07	62.70	94.65	75.31	106.77	81.48	98.50	2898.25	412.67	114.02	546.75	4550.27	191.48	184.65	93.95	89.92
Oct-02	89.57	99.16	93.07	62.70	96.53	77.92	114.37	81.48	98.50	2899.99	414.43	114.02	546.75	4640.74	198.12	197.80	93.95	91.06
Nov-02	89.73	99.16	94.82	62.70	96.53	77.19	127.96	81.48	98.50	2905.18	414.43	116.16	546.75	4640.74	196.28	221.31	93.95	91.35
Dec-02	89.41	99.16	94.82	62.70	96.53	73.92	139.88	81.48	98.50	2894.79	414.43	116.16	546.75	4640.74	187.95	241.92	93.95	91.37
Jan-03	89.73	99.46	94.82	62.70	96.53	78.47	146.83	82.59	98.50	2905.18	415.69	116.16	546.75	4640.74	199.53	253.93	95.23	91.73
Feb-03	90.59	99.34	94.82	62.70	96.53	81.36	149.70	82.86	98.89	2932.88	415.18	116.16	546.75	4640.74	206.88	258.90	95.53	92.13
Mar-03	91.76	99.46	94.82	74.23	96.53	88.64	153.77	83.70	100.50	2970.97	415.69	116.16	647.28	4640.74	225.38	265.94	96.51	93.79
Apr-03	92.57	99.34	95.54	74.21	99.85	88.86	130.00	83.70	102.06	2996.94	415.18	117.04	647.04	4800.40	225.95	224.83	96.51	95.24
May-03	92.73	99.28	96.08	72.49	99.85	80.19	109.34	83.70	102.28	3002.13	414.93	117.71	632.04	4800.40	203.91	189.10	96.51	94.57
Jun-03	92.78	99.28	96.87	71.97	99.85	78.19	114.01	83.70	102.28	3003.87	414.93	118.67	627.51	4800.40	198.83	197.18	96.51	94.58
Jul-03	92.73	99.16	97.53	71.97	99.85	78.19	121.32	83.70	104.89	3002.13	414.43	119.48	627.51	4800.40	198.83	209.81	96.51	94.69
Aug-03	92.89	99.04	97.53	71.97	99.85	78.19	123.71	83.70	104.89	3007.33	413.93	119.48	627.51	4800.40	198.83	213.96	96.51	94.78

Sep-03	93.90	99.10	97.65	72.95	98.19	83.44	127.07	83.70	104.89	3040.22	414.18	119.63	636.09	4720.57	212.18	219.76	96.51	94.59
Oct-03	94.17	99.16	97.89	74.54	98.19	82.17	125.39	87.99	104.89	3048.88	414.43	119.92	649.90	4720.57	208.93	216.86	101.45	94.81
Nov-03	94.60	99.16	97.89	80.19	99.15	80.92	123.47	89.42	104.89	3062.73	414.43	119.92	699.22	4766.69	205.75	213.54	103.10	95.85
Dec-03	94.55	99.22	97.89	81.42	99.15	83.03	125.81	89.42	104.89	3061.00	414.68	119.92	709.94	4766.69	211.12	217.58	103.10	96.04
Jan-04	95.56	99.22	97.89	87.10	99.45	89.33	127.54	89.42	104.89	3093.89	414.68	119.92	759.49	4780.88	227.15	220.58	103.10	97.20
Feb-04	96.15	99.22	97.89	87.10	99.15	89.33	126.05	89.42	104.89	3112.94	414.68	119.92	759.49	4766.69	227.15	218.00	103.10	97.22
Mar-04	96.15	99.22	98.31	87.10	100.59	89.33	126.29	92.22	104.89	3112.94	414.68	120.44	759.49	4835.88	227.15	218.41	106.33	97.95
Apr-04	96.74	99.22	98.67	87.10	100.59	89.33	114.43	100.74	104.89	3131.98	414.68	120.88	759.49	4835.88	227.15	197.90	116.15	98.04
May-04	97.38	99.40	98.67	87.10	100.59	89.81	90.42	100.74	104.89	3152.76	415.44	120.88	759.49	4835.88	228.35	156.38	116.15	97.85
Jun-04	99.04	99.46	98.67	89.29	100.59	91.47	77.54	100.74	103.83	3206.43	415.69	120.88	778.55	4835.88	232.59	134.11	116.15	98.40
Jul-04	99.79	99.64	99.52	91.45	99.34	93.58	81.38	100.74	102.78	3230.67	416.44	121.91	797.37	4775.56	237.96	140.74	116.15	98.37
Aug-04	100.75	99.64	99.82	100.08	99.34	98.72	94.43	100.79	102.17	3261.83	416.44	122.28	872.65	4775.56	251.02	163.32	116.21	99.79
Sep-04	101.28	99.70	99.82	100.08	99.34	99.39	100.30	100.79	98.50	3279.15	416.69	122.28	872.65	4775.56	252.72	173.46	116.21	100.09
Oct-04	101.02	99.76	99.82	100.08	99.34	99.39	103.41	97.72	98.50	3270.49	416.95	122.28	872.65	4775.56	252.72	178.85	112.67	100.02
Nov-04	101.71	99.88	100.90	109.18	99.34	107.83	104.49	97.72	98.50	3293.00	417.45	123.61	951.98	4775.56	274.19	180.71	112.67	101.29
Dec-04	100.96	100.24	102.71	109.18	99.34	107.83	105.21	97.72	98.50	3268.76	418.96	125.82	951.98	4775.56	274.19	181.96	112.67	101.10
Jan-05	100.86	100.78	102.83	109.18	101.37	107.83	105.93	99.58	98.39	3265.30	421.23	125.97	951.98	4873.13	274.19	183.20	114.81	102.10
Feb-05	100.96	101.99	101.81	109.18	101.37	107.83	114.01	102.38	97.61	3268.76	426.26	124.72	951.98	4873.13	274.19	197.18	118.04	102.34
Mar-05	101.28	102.47	102.29	109.21	101.37	108.25	111.20	102.38	97.61	3279.15	428.28	125.31	952.22	4873.13	275.25	192.31	118.04	102.44
Apr-05	102.70	101.80	102.20	109.21	101.20	108.40	106.70	101.10	99.20	3325.01	425.48	125.20	952.22	4865.18	275.63	184.53	116.57	102.70
May-05	102.50	101.90	102.20	109.21	101.20	108.40	101.60	101.00	99.60	3318.54	425.89	125.20	952.22	4865.18	275.63	175.71	116.45	102.55
Jun-05	102.90	101.80	102.70	110.46	113.90	110.60	102.10	101.00	99.50	3331.49	425.48	125.81	963.18	5475.74	281.23	176.58	116.45	108.96
Jul-05	104.00	102.00	102.70	119.51	113.90	117.10	101.40	101.00	100.10	3367.10	426.31	125.81	1042.04	5475.74	297.75	175.37	116.45	110.27
Aug-05	104.10	102.00	102.70	119.51	113.90	116.90	101.80	100.90	100.80	3370.34	426.31	125.81	1042.04	5475.74	297.24	176.06	116.34	110.30
Sep-05	104.90	102.20	102.70	134.20	113.90	123.20	104.30	100.80	101.60	3396.24	427.15	125.81	1170.14	5475.74	313.26	180.38	116.22	112.05
Oct-05	105.40	102.20	103.80	134.80	107.50	125.30	108.20	100.80	101.20	3412.43	427.15	127.16	1175.37	5168.06	318.60	187.13	116.22	109.32

Nov-05	105.50	102.20	103.90	131.40	107.50	125.30	113.00	102.10	101.80	3415.66	427.15	127.28	1145.73	5168.06	318.60	195.43	117.72	109.16
Dec-05	104.90	102.20	103.90	124.80	107.50	125.30	122.30	102.50	101.60	3396.24	427.15	127.28	1088.18	5168.06	318.60	211.51	118.18	108.55
Jan-06	105.40	102.70	104.00	126.90	107.50	125.30	116.80	102.50	104.10	3412.43	429.24	127.40	1106.49	5168.06	318.60	202.00	118.18	108.82
Feb-06	105.60	102.80	104.40	129.80	111.60	125.30	115.50	104.00	104.40	3418.90	429.66	127.89	1131.77	5365.16	318.60	199.75	119.91	111.12
Mar-06	105.70	103.00	104.70	132.00	111.60	125.30	112.60	104.50	105.50	3422.14	430.49	128.26	1150.96	5365.16	318.60	194.74	120.49	111.31
Apr-06	107.80	104.00	105.30	137.20	111.60	125.30	112.80	104.50	106.40	3490.13	434.67	129.00	1196.30	5365.16	318.60	195.08	120.49	112.49
May-06	108.70	104.10	105.30	148.50	111.60	125.30	109.10	127.60	107.40	3519.27	435.09	129.00	1294.83	5365.16	318.60	188.68	147.12	113.98
Jun-06	109.90	104.30	105.30	150.00	111.60	131.60	115.20	128.20	108.00	3558.12	435.93	129.00	1307.91	5365.16	334.62	199.23	147.81	114.78
Jul-06	110.80	104.60	106.50	155.20	111.60	133.70	116.30	128.20	107.90	3587.26	437.18	130.47	1353.25	5365.16	339.96	201.14	147.81	115.62
Aug-06	111.50	104.40	107.40	164.80	111.60	133.70	117.30	128.20	110.40	3609.92	436.34	131.57	1436.95	5365.16	339.96	202.87	147.81	116.71
Sep-06	112.20	104.70	107.40	151.20	119.40	133.70	117.30	128.20	111.40	3632.58	437.60	131.57	1318.37	5740.15	339.96	202.87	147.81	119.51
Oct-06	112.70	105.60	107.40	143.30	119.40	133.70	118.90	128.20	111.70	3648.77	441.36	131.57	1249.49	5740.15	339.96	205.63	147.81	119.05
Nov-06	112.60	105.60	107.40	132.00	119.40	133.70	119.80	128.20	112.50	3645.53	441.36	131.57	1150.96	5740.15	339.96	207.19	147.81	118.05
Dec-06	112.20	105.60	107.40	133.80	118.20	129.50	120.90	143.40	113.80	3632.58	441.36	131.57	1166.65	5682.46	329.28	209.09	165.34	117.58
Jan-07	112.40	105.60	107.40	133.60	116.30	129.50	117.00	145.70	117.20	3639.06	441.36	131.57	1164.91	5591.12	329.28	202.35	167.99	116.68
Feb-07	112.60	105.50	108.00	133.20	116.80	127.40	115.50	145.70	118.80	3645.53	440.94	132.30	1161.42	5615.15	323.94	199.75	167.99	116.87
Mar-07	112.80	105.80	108.70	142.90	115.60	125.20	116.00	145.70	120.80	3652.01	442.19	133.16	1246.00	5557.46	318.35	200.62	167.99	117.18
Apr-07	114.50	106.00	109.50	143.90	115.60	125.20	120.40	145.70	122.00	3707.05	443.03	134.14	1254.72	5557.46	318.35	208.23	167.99	117.91
May-07	114.70	105.90	109.50	153.00	115.80	125.10	116.20	145.70	123.00	3713.52	442.61	134.14	1334.06	5567.08	318.09	200.96	167.99	118.78
Jun-07	114.80	106.40	109.50	154.20	115.80	125.00	113.20	145.80	122.40	3716.76	444.70	134.14	1344.53	5567.08	317.84	195.78	168.10	118.89
Jul-07	115.70	106.50	109.50	148.40	115.80	125.00	113.90	145.80	122.50	3745.90	445.12	134.14	1293.96	5567.08	317.84	196.99	168.10	118.69
Aug-07	116.00	106.40	110.30	148.70	115.80	125.00	117.40	145.80	123.30	3755.61	444.70	135.12	1296.57	5567.08	317.84	203.04	168.10	118.88
Sep-07	116.00	106.10	110.50	146.20	115.80	125.00	118.70	145.80	124.30	3755.61	443.45	135.37	1274.77	5567.08	317.84	205.29	168.10	118.68
Oct-07	116.30	106.10	110.50	155.10	115.80	125.00	124.00	145.80	124.70	3765.32	443.45	135.37	1352.37	5567.08	317.84	214.45	168.10	119.64
Nov-07	116.80	105.90	110.50	165.60	115.80	125.00	126.90	145.80	124.60	3781.51	442.61	135.37	1443.93	5567.08	317.84	219.47	168.10	120.76
Dec-07	116.70	106.10	111.10	179.50	115.80	125.00	126.50	145.80	124.40	3778.27	443.45	136.10	1565.13	5567.08	317.84	218.78	168.10	121.95

Jan-08	117.50	107.00	111.20	182.80	113.40	125.00	124.30	145.80	129.10	3804.17	447.21	136.22	1593.90	5451.70	317.84	214.97	168.10	121.34
Feb-08	119.00	107.00	111.20	178.50	113.40	127.10	132.40	145.80	130.90	3852.74	447.21	136.22	1556.41	5451.70	323.18	228.98	168.10	121.65
Mar-08	121.50	107.00	111.20	191.70	117.50	129.50	131.00	146.20	131.10	3933.68	447.21	136.22	1671.50	5648.81	329.28	226.56	168.56	125.62
Apr-08	123.50	107.30	111.90	191.90	117.50	129.50	127.00	148.00	132.70	3998.43	448.46	137.08	1673.25	5648.81	329.28	219.64	170.64	126.26
May-08	124.10	107.90	112.10	208.90	117.50	129.50	125.00	148.30	134.30	4017.86	450.97	137.33	1821.48	5648.81	329.28	216.18	170.99	127.93
Jun-08	127.30	107.60	112.80	244.40	117.50	142.20	109.20	168.50	136.10	4121.46	449.72	138.18	2131.02	5648.81	361.58	188.86	194.28	132.34
Jul-08	128.60	107.00	112.80	266.50	117.50	142.20	113.20	175.20	140.00	4163.55	447.21	138.18	2323.71	5648.81	361.58	195.78	202.00	134.81
Aug-08	128.90	107.10	112.80	245.60	117.50	142.20	110.40	177.90	143.60	4173.26	447.63	138.18	2141.48	5648.81	361.58	190.93	205.11	133.07
Sep-08	128.50	106.80	112.80	234.50	117.50	142.20	109.20	179.10	146.30	4160.31	446.37	138.18	2044.69	5648.81	361.58	188.86	206.50	131.95
Oct-08	128.70	106.70	112.80	203.80	117.50	142.20	107.80	179.70	147.70	4166.79	445.96	138.18	1777.01	5648.81	361.58	186.44	207.19	129.32
Nov-08	126.90	106.50	112.80	118.70	117.50	142.20	109.30	178.70	147.00	4108.51	445.12	138.18	1034.99	5648.81	361.58	189.03	206.04	121.32
Dec-08	124.50	106.50	112.80	89.00	117.50	134.10	107.70	174.50	145.20	4030.81	445.12	138.18	776.02	5648.81	340.98	186.26	201.19	117.67
Jan-09	124.40	108.60	122.00	100.00	117.50	132.40	108.70	174.50	148.20	4027.57	453.90	149.45	871.94	5648.81	336.66	187.99	201.19	118.78
Feb-09	123.30	108.00	122.00	116.80	117.50	125.40	109.80	174.50	149.70	3991.95	451.39	149.45	1018.42	5648.81	318.86	189.89	201.19	119.70
Mar-09	123.50	108.50	122.10	119.60	108.70	125.70	112.20	174.50	150.00	3998.43	453.48	149.58	1042.84	5225.75	319.62	194.05	201.19	115.85
Apr-09	125.00	108.20	122.60	131.30	108.70	125.70	114.30	174.50	152.40	4046.99	452.23	150.19	1144.85	5225.75	319.62	197.68	201.19	117.39
May-09	125.90	107.90	122.70	140.60	108.70	125.70	114.00	174.50	157.20	4076.13	450.97	150.31	1225.94	5225.75	319.62	197.16	201.19	118.47
Jun-09	126.80	108.00	122.70	145.60	108.70	125.70	116.00	174.50	158.20	4105.27	451.39	150.31	1269.54	5225.75	319.62	200.62	201.19	119.24
Jul-09	128.20	107.90	122.70	165.80	108.70	133.90	119.50	174.50	159.90	4150.60	450.97	150.31	1445.67	5225.75	340.47	206.67	201.19	121.72
Aug-09	129.60	107.70	122.70	159.80	117.40	133.90	123.30	174.50	165.30	4195.92	450.14	150.31	1393.36	5644.00	340.47	213.24	201.19	125.89
Sep-09	130.30	107.60	122.60	162.00	117.40	133.90	139.80	174.50	166.30	4218.59	449.72	150.19	1412.54	5644.00	340.47	241.78	201.19	126.58
Oct-09	131.00	108.50	123.20	157.40	117.40	133.90	136.40	174.50	166.50	4241.25	453.48	150.92	1372.43	5644.00	340.47	235.90	201.19	126.40
Nov-09	132.90	108.90	123.20	160.20	117.40	133.90	144.60	174.50	166.90	4302.76	455.15	150.92	1396.84	5644.00	340.47	250.08	201.19	127.41
Dec-09	133.40	109.30	123.20	165.20	117.40	133.90	143.00	174.50	168.80	4318.95	456.82	150.92	1440.44	5644.00	340.47	247.31	201.19	128.00
Jan-10	135.20	109.10	123.50	184.30	117.40	133.90	182.30	174.50	173.10	4377.23	455.99	151.29	1606.98	5644.00	340.47	315.28	201.19	130.92
Feb-10	135.20	109.20	123.50	185.30	117.40	136.60	176.50	174.50	175.60	4377.23	456.41	151.29	1615.70	5644.00	347.34	305.25	201.19	130.98

Mar-10	136.30	110.10	123.70	180.10	117.40	144.60	199.10	174.50	175.80	4412.84	460.17	151.54	1570.36	5644.00	367.68	344.34	201.19	131.52
Apr-10	138.60	114.60	123.50	187.10	117.40	145.60	182.20	174.50	177.00	4487.31	478.97	151.29	1631.39	5644.00	370.22	315.11	201.19	132.79
May-10	139.10	115.00	123.90	187.30	126.20	145.60	165.20	194.20	177.00	4503.49	480.65	151.78	1633.14	6067.06	370.22	285.71	223.91	137.16
Jun-10	139.80	115.00	124.00	174.90	126.20	147.40	171.30	194.20	177.00	4526.16	480.65	151.90	1525.02	6067.06	374.80	296.26	223.91	136.46
Jul-10	141.00	115.00	124.00	174.70	126.20	153.50	173.40	194.20	177.60	4565.01	480.65	151.90	1523.27	6067.06	390.31	299.89	223.91	137.02
Aug-10	141.10	116.00	124.00	170.60	126.20	153.50	180.70	194.20	177.80	4568.25	484.83	151.90	1487.53	6067.06	390.31	312.51	223.91	136.86
Sep-10	142.00	116.10	124.20	174.30	126.20	153.50	186.50	194.20	178.00	4597.39	485.24	152.15	1519.79	6067.06	390.31	322.54	223.91	137.58
Oct-10	142.90	115.90	125.00	182.30	126.20	153.50	192.70	194.20	178.20	4626.52	484.41	153.13	1589.54	6067.06	390.31	333.27	223.91	138.68
Nov-10	143.80	116.20	125.60	190.90	126.20	153.60	190.70	194.20	178.60	4655.66	485.66	153.86	1664.53	6067.06	390.56	329.81	223.91	139.71
Dec-10	146.00	116.10	125.60	203.80	126.20	153.60	190.30	194.20	178.90	4726.89	485.24	153.86	1777.01	6067.06	390.56	329.12	223.91	141.54
Jan-11	148.00	117.00	128.00	217.10	128.10	153.60	193.90	194.20	181.30	4791.64	489.01	156.80	1892.98	6158.40	390.56	335.34	223.91	144.39
Feb-11	148.10	119.20	128.30	218.60	128.10	153.60	198.50	194.20	181.40	4794.88	498.20	157.17	1906.06	6158.40	390.56	343.30	223.91	144.72
Mar-11	149.50	119.70	128.90	228.30	128.10	153.60	205.80	194.20	180.50	4840.20	500.29	157.91	1990.63	6158.40	390.56	355.92	223.91	146.18
Apr-11	152.10	121.60	131.40	246.30	128.10	153.60	200.60	214.00	183.80	4924.38	508.23	160.97	2147.58	6158.40	390.56	346.93	246.74	148.84
May-11	152.40	123.50	134.80	256.80	128.10	153.60	176.80	220.80	181.20	4934.10	516.17	165.13	2239.14	6158.40	390.56	305.77	254.58	149.64
Jun-11	153.10	123.90	134.80	240.20	128.10	157.10	179.50	220.80	180.00	4956.76	517.84	165.13	2094.39	6158.40	399.46	310.44	254.58	148.57
Jul-11	154.20	125.00	136.00	232.60	128.10	167.80	182.70	221.80	184.90	4992.37	522.44	166.60	2028.13	6158.40	426.67	315.97	255.73	148.66
Aug-11	154.90	125.80	136.40	240.40	128.10	167.80	188.20	231.20	186.30	5015.04	525.79	167.09	2096.14	6158.40	426.67	325.48	266.57	149.81
Sep-11	156.20	127.90	137.20	241.40	133.80	167.80	189.80	236.60	186.40	5057.12	534.56	168.07	2104.86	6432.43	426.67	328.25	272.79	153.25
Oct-11	157.00	131.80	137.50	245.80	135.70	167.80	191.20	236.60	186.40	5083.02	550.86	168.44	2143.22	6523.77	426.67	330.67	272.79	154.99
Nov-11	157.40	134.00	137.80	243.10	135.70	167.80	196.90	236.60	186.20	5095.97	560.06	168.81	2119.68	6523.77	426.67	340.53	272.79	155.08
Dec-11	157.30	135.10	137.80	253.00	135.70	167.80	198.90	236.60	186.20	5092.74	564.66	168.81	2206.00	6523.77	426.67	343.99	272.79	155.99
Jan-12	158.70	135.80	137.90	267.90	135.70	167.80	198.50	236.60	187.30	5138.06	567.58	168.93	2335.92	6523.77	426.67	343.30	272.79	157.77
Feb-12	159.30	136.30	138.00	267.50	135.70	167.80	197.40	236.60	191.80	5157.49	569.67	169.05	2332.43	6523.77	426.67	341.40	272.79	157.93
Mar-12	161.00	137.30	138.40	289.30	135.70	167.80	202.20	236.60	197.30	5212.53	573.85	169.54	2522.51	6523.77	426.67	349.70	272.79	160.51
Apr-12	163.50	138.70	138.30	296.10	135.70	167.80	205.70	236.60	195.40	5293.47	579.70	169.42	2581.81	6523.77	426.67	355.75	272.79	162.03

May-12	163.90	138.80	138.30	284.40	135.70	167.80	203.40	236.60	195.60	5306.42	580.12	169.42	2479.79	6523.77	426.67	351.77	272.79	161.11
Jun-12	164.70	140.20	140.70	249.40	166.30	167.80	196.00	241.40	199.70	5332.32	585.97	172.36	2174.61	7994.86	426.67	338.97	278.33	173.04
Jul-12	165.80	144.00	140.70	236.50	166.30	167.80	208.40	241.40	199.70	5367.93	601.85	172.36	2062.13	7994.86	426.67	360.42	278.33	172.65
Aug-12	167.30	144.80	140.90	257.90	166.30	168.60	217.80	241.40	199.70	5416.50	605.20	172.61	2248.73	7994.86	428.70	376.68	278.33	175.22
Sep-12	168.80	146.10	141.20	287.70	166.30	182.80	228.10	241.40	201.80	5465.06	610.63	172.98	2508.56	7994.86	464.81	394.49	278.33	178.90
Oct-12	168.50	146.30	141.50	282.60	166.30	192.30	236.10	241.40	209.30	5455.35	611.47	173.34	2464.10	7994.86	488.97	408.33	278.33	178.75
Nov-12	168.80	146.60	142.40	276.60	166.30	192.30	239.60	241.40	214.30	5465.06	612.72	174.45	2411.78	7994.86	488.97	414.38	278.33	178.41
Dec-12	168.80	147.50	143.70	278.40	166.30	192.30	237.50	253.30	225.20	5465.06	616.48	176.04	2427.47	7994.86	488.97	410.75	292.05	178.72
Jan-13	170.30	148.00	143.70	283.30	166.30	198.80	241.90	253.30	225.20	5513.62	618.57	176.04	2470.20	7994.86	505.49	418.36	292.05	179.89
Feb-13	170.90	148.00	143.70	286.30	166.30	202.70	246.20	253.30	231.10	5533.05	618.57	176.04	2496.36	7994.86	515.41	425.79	292.05	180.52
Mar-13	170.10	147.70	143.70	289.60	166.30	201.70	250.40	253.30	232.20	5507.15	617.32	176.04	2525.13	7994.86	512.87	433.06	292.05	180.58
Apr-13	171.30	147.80	143.70	271.50	184.80	202.30	246.00	253.30	233.80	5546.00	617.74	176.04	2367.31	8884.25	514.39	425.45	292.05	188.23
May-13	171.40	147.10	143.70	253.70	184.80	203.40	244.20	253.30	233.30	5549.24	614.81	176.04	2212.11	8884.25	517.19	422.33	292.05	186.68
Jun-13	173.20	146.40	143.70	268.70	184.80	207.00	257.10	253.30	234.10	5607.51	611.88	176.04	2342.90	8884.25	526.34	444.64	292.05	188.86
Jul-13	175.50	147.20	143.70	286.30	184.80	212.00	265.30	253.30	238.20	5681.98	615.23	176.04	2496.36	8884.25	539.06	458.83	292.05	191.44
Aug-13	179.00	147.70	143.80	299.20	203.00	215.40	267.60	253.30	237.70	5795.30	617.32	176.16	2608.84	9759.21	547.70	462.80	292.05	202.59
Sep-13	180.70	148.30	144.30	330.90	206.90	219.80	270.10	263.90	238.80	5850.33	619.82	176.77	2885.24	9946.71	558.89	467.13	304.27	208.09
Oct-13	180.70	148.90	144.70	312.30	209.10	220.40	270.70	263.90	238.40	5850.33	622.33	177.26	2723.06	10052.47	560.42	468.17	304.27	207.58
Nov-13	181.50	149.00	144.70	314.70	209.10	222.40	274.10	263.90	239.00	5876.24	622.75	177.26	2743.99	10052.47	565.50	474.05	304.27	208.17
Dec-13	179.60	148.70	145.00	325.60	205.50	225.00	278.30	263.90	246.60	5814.72	621.50	177.63	2839.03	9879.40	572.11	481.31	304.27	206.90
Jan-14	179.00	149.00	149.00	329.10	205.50	226.60	285.50	263.90	244.90	5795.30	622.75	182.53	2869.55	9879.40	576.18	493.76	304.27	207.24
Feb-14	179.50	149.10	149.60	319.90	205.50	228.60	299.00	263.90	251.40	5811.48	623.17	183.27	2789.33	9879.40	581.27	517.11	304.27	206.89
Mar-14	180.30	149.60	150.10	317.50	211.30	231.20	316.80	263.90	259.40	5837.38	625.26	183.88	2768.40	10158.24	587.88	547.89	304.27	210.13

Table 4.1: Revenue and Subsidy Scenario of Petroleum Products

Year	POL Revenue	Non POL Revenue	Total Revenue	% Share of POL Revenue in Total Revenue	Total POL Subsidies[1]	% Share of Subsidy on POL to Total Revenue	% Share of Subsidy on POL to POL Revenue
2002-03	35961	46293	82254	44.56	4496	5.47	12.50
2003-04	40151	50756	90907	44.56	6292	6.92	15.67
2004-05	43145	55476	98621	44.56	2930	2.97	6.79
2005-06	51750	58957	110707	47.53	2662	2.40	5.14
2006-07	57884	58762	116646	50.5	2524	2.16	4.36
2007-08	60230	62709	122939	49.51	2641	2.15	4.38
2008-09	59383	45318	104701	57.43	2688	2.57	4.53
2009-10	64012	38829	102924	62.38	2770	2.69	4.33
2010-11	76546	59974	136350	56.44	2905	2.13	3.80
2011-12	74829	69883	144712	52.48	3000	2.07	4.01
2012-13	84889	88393	173282	49.51	2730	1.58	3.22
2013-14	88600	78699	167299	53.47	2580	1.54	2.91

Source: Ministry of Petroleum & Natural Gas, Govt. of India. (11014) and Petroleum Planning & Analysis Cell

[1] Here we have included only the PDS Kerosene and LPG subsidies

5.1 Derivation o Money Multiplier:

My definition, broad money (M_3) is given by:

$$M_3 = m.\ H$$

$$m = \frac{Ms}{H}$$

M= C+DD+TD

H= C+R

$$m = \ M/H = \frac{C + DD + TD}{C + R}$$

$$\mathrm{m} = \frac{(\mathrm{C} + \mathrm{DD} + \mathrm{TD})}{\mathrm{C} + \mathrm{R}}$$

$$m = \frac{C + DD + TD}{C + r(DD + TD)}$$

$$m = \frac{1 + \frac{C}{DD} + \frac{TD}{DD}}{\frac{C}{DD} + r(1 + \frac{TD}{DD})}$$

$$= \frac{1 + c + t}{c + r(1 + t)}$$

Where:

c= C/DD is currency deposit ratio

t=TD/DD is ration of time to deposit ratios

r= reserve deposit ratio

Hence from the equation (III)

$$M = \frac{1 + c + t}{c + r(1 + t)}.H$$

Table 5.1: Sources of Stock of Money (Rupees in Billion)

year	NET RBI credit Govt.	RBI Credit to com. Sector	RBI Credit Banks	NFEA to RBI	Govt.'s Currency Liabilities to Public	Net Non-monetary Liabilities of RBI	Reserve Money
1990-91	888.48	63.42	100.07	79.83	16.21	270.22	877.79
1991-92	940.16	72.60	51.02	188.38	17.04	274.15	995.05
1992-93	984.49	62.20	98.85	226.47	18.24	282.46	1107.79
1993-94	993.00	64.45	55.52	514.22	19.90	260.37	1386.72
1994-95	1014.78	65.93	134.70	747.20	23.79	293.58	1692.82
1995-96	1213.49	68.55	219.55	740.92	25.03	322.97	1944.57
1996-97	1241.81	62.47	70.05	948.17	29.18	351.84	1999.84
1997-98	1351.60	81.86	70.96	1158.90	33.52	432.82	2264.02
1998-99	1525.39	122.26	132.62	1379.54	38.46	605.40	2592.87
1999-00	1482.64	152.70	167.85	1658.80	45.78	702.22	2805.55
2000-01	1538.77	132.87	129.65	1971.87	53.54	793.74	3032.95
2001-02	1521.78	59.29	107.48	2639.79	63.66	1012.48	3379.52
2002-03	1206.79	30.48	71.60	3582.49	70.71	1271.70	3690.38
2003-04	449.07	20.61	54.19	4844.19	72.96	1076.13	4364.90
2004-05	-179.75	13.90	52.58	6127.95	74.48	1198.04	4891.11
2005-06	65.99	13.87	57.95	6729.86	76.56	1224.92	5719.32
2006-07	24.23	15.37	76.35	8661.52	81.61	1770.47	7088.61
2007-08	-1132.09	17.88	45.90	12361.31	92.24	2102.50	82.75
2008-09	615.80	138.20	103.57	12801.08	100.54	3879.58	9879.61
2009-10	2115.86	13.28	11.69	12319.44	112.70	3016.43	11556.53
2010-11	3965.55	21.64	51.59	13285.69	127.24	3683.50	13768.21
2011-12	5357.38	39.60	48.47	14721.95	134.44	6038.41	14263.44
2012-13	5905.78	30.58	403.54	15580.59	153.40	6925.02	15148.86
2013-14	6987.08	88.39	486.50	18025.25	173.36	8433.19	17327.39
2014-15	3734.07	148.47	1876.58	21272.79	194.41	7941.60	19284.71

Source: RBI Data Base on Indian Economy

Table 5.2: Components of Money Supply (Rupee in Billion)

YEAR	Currency with the Public	Other Deposits with the RBI	Demand Deposits	Time Deposits	Reserves	DD+TD
1990-91	530.48	6.74	391.70	1729.36	340.57	2121.06
1991-92	610.98	8.85	524.23	2026.43	375.22	2550.66
1992-93	682.73	13.13	544.80	2399.50	411.93	2944.30
1993-94	823.01	25.25	659.52	2803.06	538.46	3462.58
1994-95	1006.81	33.83	881.93	3353.38	652.18	4235.31
1995-96	1182.58	33.44	932.33	3843.56	728.55	4775.89
1996-97	1320.87	31.94	1053.34	4553.97	647.04	5607.31
1997-98	1455.79	35.41	1187.25	5534.88	772.83	6722.13
1998-99	1689.44	37.36	1363.88	6718.92	866.05	8082.80
1999-00	1890.82	30.34	1496.81	7823.78	884.39	9320.59
2000-01	2095.50	36.13	1662.70	9337.71	901.31	11000.41
2001-02	2407.94	28.31	1791.99	10755.12	943.26	12547.11
2002-03	2715.81	32.19	1987.57	12443.79	942.38	14431.36
2003-04	3149.71	50.97	2586.26	14269.60	1164.22	16855.86
2004-05	3563.14	64.54	2869.98	15958.87	1263.43	18828.85
2005-06	4121.24	68.43	4074.23	18931.04	1529.65	23005.26
2006-07	4828.54	74.67	4776.04	23421.13	2185.40	28197.17
2007-08	5684.10	90.27	5783.72	28620.46	3508.37	34404.18
2008-09	6654.50	55.33	5886.88	35351.05	3169.78	41237.92
2009-10	7674.92	38.06	7179.70	41134.30	3843.55	48314.00
2010-11	9118.36	36.53	7228.56	48657.71	4613.32	55886.27
2011-12	10236.70	28.22	7109.02	56474.37	3998.52	63583.40
2012-13	11410.61	32.40	7532.25	64922.93	3705.86	72455.18
2013-14	12458.17	19.65	8119.78	74576.24	4849.58	82696.02
2014-15	13869.87	145.86	8963.49	82777.54	5268.97	91741.02

Source: RBI Data Base on Indian Economy

6.1: Appendix

Time	MP	M3	Call Money R	A-Min1	A-min2	A-min3	S1	S2	S3	1-S3	1/2S1	1/4S2	1/4(1-S3)	MPI
1991-92 Apr.	-1	14.51	21.18	0	3.27	20.45	0.00	0.26	0.59	0.41	0.00	0.06	0.10	0.17
May	-1	15.48	34.92	0	4.24	34.19	0.00	0.33	0.99	0.01	0.00	0.08	0.00	0.09
Jun.	0	15.40	24.77	1	4.16	24.04	0.50	0.33	0.70	0.30	0.25	0.08	0.08	0.41
Jul.	-1	15.14	21.63	0	3.90	20.90	0.00	0.31	0.60	0.40	0.00	0.08	0.10	0.18
Aug.	0	16.23	13.70	1	4.99	12.97	0.50	0.39	0.38	0.62	0.25	0.10	0.16	0.50
Sep.	0	16.16	12.87	1	4.92	12.14	0.50	0.39	0.35	0.65	0.25	0.10	0.16	0.51
Oct.	-1	17.64	21.82	0	6.40	21.09	0.00	0.50	0.61	0.39	0.00	0.13	0.10	0.22
Nov.	0	18.65	22.31	1	7.41	21.58	0.50	0.58	0.62	0.38	0.25	0.15	0.09	0.49
Dec.	0	18.83	12.66	1	7.59	11.93	0.50	0.60	0.35	0.65	0.25	0.15	0.16	0.56
Jan.	0	18.92	11.75	1	7.68	11.02	0.50	0.60	0.32	0.68	0.25	0.15	0.17	0.57
Feb.	1	18.72	9.41	2	7.48	8.68	1.00	0.59	0.25	0.75	0.50	0.15	0.19	0.83
Mar.	0	19.48	14.25	1	8.24	13.52	0.50	0.65	0.39	0.61	0.25	0.16	0.15	0.56
1992-93 Apr.	0	19.04	26.57	1	7.80	25.84	0.50	0.61	0.75	0.25	0.25	0.15	0.06	0.47
May	0	19.51	35.29	1	8.27	34.56	0.50	0.65	1.00	0.00	0.25	0.16	0.00	0.41
Jun.	0	20.32	15.82	1	9.08	15.09	0.50	0.71	0.44	0.56	0.25	0.18	0.14	0.57
Jul.	0	20.50	12.98	1	9.26	12.25	0.50	0.73	0.35	0.65	0.25	0.18	0.16	0.59
Aug.	0	20.46	10.76	1	9.22	10.03	0.50	0.72	0.29	0.71	0.25	0.18	0.18	0.61
Sep.	0	18.91	11.42	1	7.67	10.69	0.50	0.60	0.31	0.69	0.25	0.15	0.17	0.57
Oct.	1	18.11	11.79	2	6.87	11.06	1.00	0.54	0.32	0.68	0.50	0.13	0.17	0.80
Nov.	0	16.85	11.51	1	5.61	10.78	0.50	0.44	0.31	0.69	0.25	0.11	0.17	0.53
Dec.	0	16.04	11.23	1	4.80	10.50	0.50	0.38	0.30	0.70	0.25	0.09	0.17	0.52
Jan.	1	15.66	12.22	2	4.42	11.49	1.00	0.35	0.33	0.67	0.50	0.09	0.17	0.75
Feb.	1	14.54	12.39	2	3.30	11.66	1.00	0.26	0.34	0.66	0.50	0.06	0.17	0.73
Mar.	0	14.52	13.90	1	3.28	13.17	0.50	0.26	0.38	0.62	0.25	0.06	0.15	0.47
1993-94 Apr.	1	16.21	13.43	2	4.97	12.70	1.00	0.39	0.37	0.63	0.50	0.10	0.16	0.76
May	0	15.12	9.13	1	3.89	8.40	0.50	0.30	0.24	0.76	0.25	0.08	0.19	0.52
Jun.	1	14.20	8.01	2	2.96	7.28	1.00	0.23	0.21	0.79	0.50	0.06	0.20	0.76
Jul.	0	14.20	6.47	1	2.96	5.74	0.50	0.23	0.17	0.83	0.25	0.06	0.21	0.52
Aug.	0	14.98	5.71	1	3.74	4.98	0.50	0.29	0.14	0.86	0.25	0.07	0.21	0.54
Sep.	1	15.28	5.00	2	4.04	4.27	1.00	0.32	0.12	0.88	0.50	0.08	0.22	0.80
Oct.	1	14.20	5.66	2	2.96	4.93	1.00	0.23	0.14	0.86	0.50	0.06	0.21	0.77
Nov.	0	15.44	6.35	1	4.20	5.62	0.50	0.33	0.16	0.84	0.25	0.08	0.21	0.54
Dec.	0	16.22	5.36	1	4.98	4.63	0.50	0.39	0.13	0.87	0.25	0.10	0.22	0.56
Jan.	0	17.70	5.71	1	6.46	4.98	0.50	0.51	0.14	0.86	0.25	0.13	0.21	0.59
Feb.	1	18.81	5.20	2	7.57	4.47	1.00	0.59	0.13	0.87	0.50	0.15	0.22	0.87
Mar.	0	18.29	4.30	1	7.05	3.57	0.50	0.55	0.10	0.90	0.25	0.14	0.22	0.61
1994-95 Apr.	0	17.90	4.90	1	6.66	4.17	0.50	0.52	0.12	0.88	0.25	0.13	0.22	0.60

May	-1	18.54	5.84	0	7.30	5.11	0.00	0.57	0.15	0.85	0.00	0.14	0.21	0.36
Jun.	0	19.12	6.70	1	7.88	5.97	0.50	0.62	0.17	0.83	0.25	0.15	0.21	0.61
Jul.	0	19.80	5.98	1	8.56	5.25	0.50	0.67	0.15	0.85	0.25	0.17	0.21	0.63
Aug.	0	18.69	5.75	1	7.45	5.02	0.50	0.58	0.15	0.85	0.25	0.15	0.21	0.61
Sep.	0	20.61	15.27	1	9.37	14.54	0.50	0.73	0.42	0.58	0.25	0.18	0.14	0.58
Oct.	1	22.24	7.89	2	11.00	7.16	1.00	0.86	0.21	0.79	0.50	0.22	0.20	0.91
Nov.	0	21.15	8.37	1	9.91	7.64	0.50	0.78	0.22	0.78	0.25	0.19	0.19	0.64
Dec.	0	20.50	9.71	1	9.26	8.98	0.50	0.73	0.26	0.74	0.25	0.18	0.19	0.62
Jan.	-1	18.86	15.32	0	7.62	14.59	0.00	0.60	0.42	0.58	0.00	0.15	0.14	0.29
Feb.	0	18.47	13.27	1	7.23	12.54	0.50	0.57	0.36	0.64	0.25	0.14	0.16	0.55
Mar.	0	21.54	13.74	1	10.30	13.01	0.50	0.81	0.38	0.62	0.25	0.20	0.16	0.61
1995-96 Apr.	0	17.48	10.91	1	6.24	10.18	0.50	0.49	0.29	0.71	0.25	0.12	0.18	0.55
May	0	17.45	13.39	1	6.21	12.66	0.50	0.49	0.37	0.63	0.25	0.12	0.16	0.53
Jun.	0	16.65	14.43	1	5.41	13.70	0.50	0.42	0.40	0.60	0.25	0.11	0.15	0.51
Jul.	0	15.99	11.28	1	4.75	10.55	0.50	0.37	0.31	0.69	0.25	0.09	0.17	0.52
Aug.	0	16.96	10.11	1	5.73	9.38	0.50	0.45	0.27	0.73	0.25	0.11	0.18	0.54
Sep.	0	15.54	12.09	1	4.30	11.36	0.50	0.34	0.33	0.67	0.25	0.08	0.17	0.50
Oct.	1	15.17	15.59	2	3.93	14.86	1.00	0.31	0.43	0.57	0.50	0.08	0.14	0.72
Nov.	1	14.52	34.83	2	3.28	34.10	1.00	0.26	0.99	0.01	0.50	0.06	0.00	0.57
Dec.	1	14.67	16.77	2	3.43	16.04	1.00	0.27	0.46	0.54	0.50	0.07	0.13	0.70
Jan.	1	15.38	14.53	2	4.14	13.80	1.00	0.32	0.40	0.60	0.50	0.08	0.15	0.73
Feb.	0	15.27	17.05	1	4.03	16.32	0.50	0.32	0.47	0.53	0.25	0.08	0.13	0.46
Mar.	0	13.50	28.75	1	2.27	28.02	0.50	0.18	0.81	0.19	0.25	0.04	0.05	0.34
1996-97 Apr.	1	16.32	11.38	2	5.08	10.65	1.00	0.40	0.31	0.69	0.50	0.10	0.17	0.77
May	0	15.04	10.88	1	3.80	10.15	0.50	0.30	0.29	0.71	0.25	0.07	0.18	0.50
Jun.	0	16.69	10.87	1	5.45	10.14	0.50	0.43	0.29	0.71	0.25	0.11	0.18	0.53
Jul.	1	16.56	3.59	2	5.32	2.86	1.00	0.42	0.08	0.92	0.50	0.10	0.23	0.83
Aug.	0	15.73	6.07	1	4.49	5.34	0.50	0.35	0.15	0.85	0.25	0.09	0.21	0.55
Sep.	0	16.02	8.36	1	4.78	7.63	0.50	0.37	0.22	0.78	0.25	0.09	0.19	0.54
Oct.	1	15.08	9.58	2	3.84	8.85	1.00	0.30	0.26	0.74	0.50	0.08	0.19	0.76
Nov.	0	15.78	6.26	1	4.54	5.53	0.50	0.36	0.16	0.84	0.25	0.09	0.21	0.55
Dec.	0	16.44	8.07	1	5.21	7.34	0.50	0.41	0.21	0.79	0.25	0.10	0.20	0.55
Jan.	0	16.96	4.84	1	5.72	4.11	0.50	0.45	0.12	0.88	0.25	0.11	0.22	0.58
Feb.	0	16.85	5.08	1	5.61	4.35	0.50	0.44	0.13	0.87	0.25	0.11	0.22	0.58
Mar.	0	16.09	4.35	1	4.85	3.62	0.50	0.38	0.10	0.90	0.25	0.10	0.22	0.57
1997-98 Apr.	1	16.23	1.22	2	4.99	0.49	1.00	0.39	0.01	0.99	0.50	0.10	0.25	0.84
May	0	17.38	5.90	1	6.14	5.17	0.50	0.48	0.15	0.85	0.25	0.12	0.21	0.58
Jun.	1	17.03	5.16	2	5.79	4.43	1.00	0.45	0.13	0.87	0.50	0.11	0.22	0.83
Jul.	0	16.85	3.77	1	5.62	3.04	0.50	0.44	0.09	0.91	0.25	0.11	0.23	0.59
Aug.	0	16.54	5.86	1	5.31	5.13	0.50	0.42	0.15	0.85	0.25	0.10	0.21	0.57
Sep.	0	16.70	6.71	1	5.46	5.98	0.50	0.43	0.17	0.83	0.25	0.11	0.21	0.56
Oct.	1	16.95	6.25	2	5.71	5.52	1.00	0.45	0.16	0.84	0.50	0.11	0.21	0.82
Nov.	0	17.87	6.13	1	6.63	5.40	0.50	0.52	0.16	0.84	0.25	0.13	0.21	0.59

Dec.	-1	17.34	8.21	0	6.10	7.48	0.00	0.48	0.22	0.78	0.00	0.12	0.20	0.32
Jan.	1	16.41	28.70	2	5.17	27.97	1.00	0.41	0.81	0.19	0.50	0.10	0.05	0.65
Feb.	1	17.09	9.70	2	5.85	8.97	1.00	0.46	0.26	0.74	0.50	0.11	0.19	0.80
Mar.	1	18.14	8.75	2	6.90	8.02	1.00	0.54	0.23	0.77	0.50	0.14	0.19	0.83
1998-99 Apr.	1	18.37	6.73	2	7.13	6.00	1.00	0.56	0.17	0.83	0.50	0.14	0.21	0.85
May	1	18.32	6.75	2	7.08	6.02	1.00	0.55	0.17	0.83	0.50	0.14	0.21	0.85
Jun.	1	18.07	6.42	2	6.83	5.69	1.00	0.54	0.16	0.84	0.50	0.13	0.21	0.84
Jul.	1	18.36	6.02	2	7.12	5.29	1.00	0.56	0.15	0.85	0.50	0.14	0.21	0.85
Aug.	1	21.19	7.59	2	9.95	6.86	1.00	0.78	0.20	0.80	0.50	0.19	0.20	0.90
Sep.	1	21.05	8.41	2	9.81	7.68	1.00	0.77	0.22	0.78	0.50	0.19	0.19	0.89
Oct.	0	21.73	8.42	1	10.49	7.69	0.50	0.82	0.22	0.78	0.25	0.21	0.19	0.65
Nov.	0	20.48	8.00	1	9.24	7.27	0.50	0.72	0.21	0.79	0.25	0.18	0.20	0.63
Dec.	0	20.18	8.33	1	8.94	7.60	0.50	0.70	0.22	0.78	0.25	0.18	0.20	0.62
Jan.	0	20.92	10.04	1	9.68	9.31	0.50	0.76	0.27	0.73	0.25	0.19	0.18	0.62
Feb.	0	20.31	8.86	1	9.07	8.13	0.50	0.71	0.24	0.76	0.25	0.18	0.19	0.62
Mar.	0	19.47	8.49	1	8.23	7.76	0.50	0.65	0.22	0.78	0.25	0.16	0.19	0.61
1999-2000 Apr.	1	18.35	8.02	2	7.11	7.29	1.00	0.56	0.21	0.79	0.50	0.14	0.20	0.84
May	1	18.84	8.76	2	7.60	8.03	1.00	0.60	0.23	0.77	0.50	0.15	0.19	0.84
Jun.	1	18.10	8.10	2	6.87	7.37	1.00	0.54	0.21	0.79	0.50	0.13	0.20	0.83
Jul.	1	18.54	8.21	2	7.31	7.48	1.00	0.57	0.22	0.78	0.50	0.14	0.20	0.84
Aug.	1	16.85	9.38	2	5.61	8.65	1.00	0.44	0.25	0.75	0.50	0.11	0.19	0.80
Sep.	1	16.85	9.67	2	5.62	8.94	1.00	0.44	0.26	0.74	0.50	0.11	0.19	0.80
Oct.	1	16.27	10.95	2	5.03	10.22	1.00	0.39	0.30	0.70	0.50	0.10	0.18	0.77
Nov.	1	16.56	8.07	2	5.32	7.34	1.00	0.42	0.21	0.79	0.50	0.10	0.20	0.80
Dec.	1	17.92	7.74	2	6.68	7.01	1.00	0.52	0.20	0.80	0.50	0.13	0.20	0.83
Jan.	1	16.53	7.87	2	5.29	7.14	1.00	0.41	0.21	0.79	0.50	0.10	0.20	0.80
Feb.	1	17.07	10.31	2	5.83	9.58	1.00	0.46	0.28	0.72	0.50	0.11	0.18	0.79
Mar.	1	14.42	9.39	2	3.18	8.66	1.00	0.25	0.25	0.75	0.50	0.06	0.19	0.75
2000-01 Apr.	1	16.37	6.79	2	5.13	6.06	1.00	0.40	0.18	0.82	0.50	0.10	0.21	0.81
May	1	15.61	7.48	2	4.37	6.75	1.00	0.34	0.20	0.80	0.50	0.09	0.20	0.79
Jun.	1	16.02	11.08	2	4.78	10.35	1.00	0.37	0.30	0.70	0.50	0.09	0.18	0.77
Jul.	1	15.28	7.77	2	4.04	7.04	1.00	0.32	0.20	0.80	0.50	0.08	0.20	0.78
Aug.	1	14.85	13.06	2	3.61	12.33	1.00	0.28	0.36	0.64	0.50	0.07	0.16	0.73
Sep.	1	14.28	10.32	2	3.04	9.59	1.00	0.24	0.28	0.72	0.50	0.06	0.18	0.74
Oct.	1	15.43	9.07	2	4.19	8.34	1.00	0.33	0.24	0.76	0.50	0.08	0.19	0.77
Nov.	0	17.21	9.28	1	5.97	8.55	0.50	0.47	0.25	0.75	0.25	0.12	0.19	0.56
Dec.	0	16.30	8.76	1	5.07	8.03	0.50	0.40	0.23	0.77	0.25	0.10	0.19	0.54
Jan.	0	16.73	9.89	1	5.49	9.16	0.50	0.43	0.27	0.73	0.25	0.11	0.18	0.54
Feb.	0	16.04	8.51	1	4.80	7.78	0.50	0.38	0.23	0.77	0.25	0.09	0.19	0.54
Mar.	0	17.08	7.78	1	5.84	7.05	0.50	0.46	0.20	0.80	0.25	0.11	0.20	0.56
2001-02 Apr.	0	17.08	7.49	1	5.84	6.76	0.50	0.46	0.20	0.80	0.25	0.11	0.20	0.57
May	0	17.99	8.03	1	6.75	7.30	0.50	0.53	0.21	0.79	0.25	0.13	0.20	0.58

Jun.	0	17.51	7.24	1	6.27	6.51	0.50	0.49	0.19	0.81	0.25	0.12	0.20	0.58
Jul.	0	17.89	7.19	1	6.65	6.46	0.50	0.52	0.19	0.81	0.25	0.13	0.20	0.58
Aug.	0	17.33	6.94	1	6.09	6.21	0.50	0.48	0.18	0.82	0.25	0.12	0.21	0.57
Sep.	0	17.28	7.30	1	6.04	6.57	0.50	0.47	0.19	0.81	0.25	0.12	0.20	0.57
Oct.	1	16.09	7.40	2	4.85	6.67	1.00	0.38	0.19	0.81	0.50	0.10	0.20	0.80
Nov.	1	14.44	6.97	2	3.20	6.24	1.00	0.25	0.18	0.82	0.50	0.06	0.20	0.77
Dec.	1	14.17	7.08	2	2.93	6.35	1.00	0.23	0.18	0.82	0.50	0.06	0.20	0.76
Jan.	1	14.43	6.63	2	3.20	5.90	1.00	0.25	0.17	0.83	0.50	0.06	0.21	0.77
Feb.	1	14.30	6.73	2	3.06	6.00	1.00	0.24	0.17	0.83	0.50	0.06	0.21	0.77
Mar.	1	14.36	6.97	2	3.13	6.24	1.00	0.24	0.18	0.82	0.50	0.06	0.20	0.77
2002-03 Apr.	1	14.18	6.58	2	2.94	5.85	1.00	0.23	0.17	0.83	0.50	0.06	0.21	0.77
May	1	16.63	6.90	2	5.39	6.17	1.00	0.42	0.18	0.82	0.50	0.11	0.21	0.81
Jun.	1	16.29	6.04	2	5.05	5.31	1.00	0.40	0.15	0.85	0.50	0.10	0.21	0.81
Jul.	1	16.22	5.75	2	4.98	5.02	1.00	0.39	0.15	0.85	0.50	0.10	0.21	0.81
Aug.	1	16.64	5.72	2	5.40	4.99	1.00	0.42	0.14	0.86	0.50	0.11	0.21	0.82
Sep.	1	16.64	5.75	2	5.40	5.02	1.00	0.42	0.15	0.85	0.50	0.11	0.21	0.82
Oct.	1	16.94	5.73	2	5.70	5.00	1.00	0.45	0.14	0.86	0.50	0.11	0.21	0.83
Nov.	1	16.47	5.45	2	5.23	4.72	1.00	0.41	0.14	0.86	0.50	0.10	0.22	0.82
Dec.	1	16.25	5.58	2	5.01	4.85	1.00	0.39	0.14	0.86	0.50	0.10	0.21	0.81
Jan.	1	15.72	5.66	2	4.48	4.93	1.00	0.35	0.14	0.86	0.50	0.09	0.21	0.80
Feb.	1	15.24	5.71	2	4.00	4.98	1.00	0.31	0.14	0.86	0.50	0.08	0.21	0.79
Mar.	1	14.79	5.86	2	3.55	5.13	1.00	0.28	0.15	0.85	0.50	0.07	0.21	0.78
2003-04 Apr.	1	14.45	4.87	2	3.21	4.14	1.00	0.25	0.12	0.88	0.50	0.06	0.22	0.78
May	1	11.24	4.87	2	0.00	4.14	1.00	0.00	0.12	0.88	0.50	0.00	0.22	0.72
Jun.	1	12.09	4.91	2	0.85	4.18	1.00	0.07	0.12	0.88	0.50	0.02	0.22	0.74
Jul.	1	12.14	4.90	2	0.90	4.17	1.00	0.07	0.12	0.88	0.50	0.02	0.22	0.74
Aug.	1	11.63	4.83	2	0.39	4.10	1.00	0.03	0.12	0.88	0.50	0.01	0.22	0.73
Sep.	1	11.71	4.50	2	0.47	3.77	1.00	0.04	0.11	0.89	0.50	0.01	0.22	0.73
Oct.	1	11.97	4.64	2	0.73	3.91	1.00	0.06	0.11	0.89	0.50	0.01	0.22	0.74
Nov.	0	12.24	4.38	1	1.00	3.65	0.50	0.08	0.11	0.89	0.25	0.02	0.22	0.49
Dec.	0	12.86	4.40	1	1.62	3.67	0.50	0.13	0.11	0.89	0.25	0.03	0.22	0.51
Jan.	0	13.66	4.43	1	2.42	3.70	0.50	0.19	0.11	0.89	0.25	0.05	0.22	0.52
Feb.	0	14.89	4.33	1	3.65	3.60	0.50	0.29	0.10	0.90	0.25	0.07	0.22	0.55
Mar.	0	16.69	4.37	1	5.45	3.64	0.50	0.43	0.11	0.89	0.25	0.11	0.22	0.58
200405 Apr.	0	15.66	4.29	1	4.42	3.56	0.50	0.35	0.10	0.90	0.25	0.09	0.22	0.56
May	1	15.48	4.30	2	4.25	3.57	1.00	0.33	0.10	0.90	0.50	0.08	0.22	0.81
Jun.	1	14.63	4.35	2	3.39	3.62	1.00	0.27	0.10	0.90	0.50	0.07	0.22	0.79
Jul.	1	13.81	4.31	2	2.57	3.58	1.00	0.20	0.10	0.90	0.50	0.05	0.22	0.77
Aug.	1	14.77	4.41	2	3.53	3.68	1.00	0.28	0.11	0.89	0.50	0.07	0.22	0.79
Sep.	1	13.93	4.45	2	2.69	3.72	1.00	0.21	0.11	0.89	0.50	0.05	0.22	0.78
Oct.	0	13.58	4.63	1	2.34	3.90	0.50	0.18	0.11	0.89	0.25	0.05	0.22	0.52
Nov.	0	13.35	5.62	1	2.11	4.89	0.50	0.17	0.14	0.86	0.25	0.04	0.21	0.51
Dec.	0	12.96	5.28	1	1.72	4.55	0.50	0.13	0.13	0.87	0.25	0.03	0.22	0.50

Jan.	0	15.00	4.72	1	3.76	3.99	0.50	0.29	0.12	0.88	0.25	0.07	0.22	0.54
Feb.	0	13.06	4.76	1	1.82	4.03	0.50	0.14	0.12	0.88	0.25	0.04	0.22	0.51
Mar.	0	11.90	4.72	1	0.66	3.99	0.50	0.05	0.12	0.88	0.25	0.01	0.22	0.48
20005-06 Apr.	-1	13.24	4.77	0	2.00	4.04	0.00	0.16	0.12	0.88	0.00	0.04	0.22	0.26
May	-1	13.49	4.99	0	2.25	4.26	0.00	0.18	0.12	0.88	0.00	0.04	0.22	0.26
Jun.	-1	14.05	5.10	0	2.81	4.37	0.00	0.22	0.13	0.87	0.00	0.06	0.22	0.27
Jul.	-1	14.56	5.02	0	3.32	4.29	0.00	0.26	0.12	0.88	0.00	0.07	0.22	0.28
Aug.	-1	14.43	5.02	0	3.19	4.29	0.00	0.25	0.12	0.88	0.00	0.06	0.22	0.28
Sep.	-1	17.52	5.05	0	6.28	4.32	0.00	0.49	0.13	0.88	0.00	0.12	0.22	0.34
Oct.	-1	17.10	5.12	0	5.86	4.39	0.00	0.46	0.13	0.87	0.00	0.11	0.22	0.33
Nov.	-1	17.35	5.79	0	6.11	5.06	0.00	0.48	0.15	0.85	0.00	0.12	0.21	0.33
Dec.	-1	17.56	6.00	0	6.32	5.27	0.00	0.50	0.15	0.85	0.00	0.12	0.21	0.34
Jan.	0	14.38	6.83	1	3.14	6.10	0.50	0.25	0.18	0.82	0.25	0.06	0.21	0.52
Feb.	0	15.94	6.95	1	4.70	6.22	0.50	0.37	0.18	0.82	0.25	0.09	0.21	0.55
Mar.	0	20.35	6.58	1	9.11	5.85	0.50	0.71	0.17	0.83	0.25	0.18	0.21	0.64
2006-07 Apr.	0	18.66	5.62	1	7.42	4.89	0.50	0.58	0.14	0.86	0.25	0.15	0.21	0.61
May	0	18.84	5.54	1	7.60	4.81	0.50	0.60	0.14	0.86	0.25	0.15	0.22	0.61
Jun.	0	17.95	5.73	1	6.71	5.00	0.50	0.53	0.14	0.86	0.25	0.13	0.21	0.60
Jul.	-1	20.01	5.86	0	8.77	5.13	0.00	0.69	0.15	0.85	0.00	0.17	0.21	0.38
Aug.	-1	21.17	6.06	0	9.93	5.33	0.00	0.78	0.15	0.85	0.00	0.19	0.21	0.41
Sep.	-1	19.12	6.33	0	7.88	5.60	0.00	0.62	0.16	0.84	0.00	0.15	0.21	0.36
Oct.	0	19.04	6.75	1	7.80	6.02	0.50	0.61	0.17	0.83	0.25	0.15	0.21	0.61
Nov.	0	19.96	6.69	1	8.72	5.96	0.50	0.68	0.17	0.83	0.25	0.17	0.21	0.63
Dec.	0	19.72	8.63	1	8.48	7.90	0.50	0.66	0.23	0.77	0.25	0.17	0.19	0.61
Jan.	-1	21.32	8.18	0	10.08	7.45	0.00	0.79	0.22	0.78	0.00	0.20	0.20	0.39
Feb.	-1	22.03	7.16	0	10.79	6.43	0.00	0.85	0.19	0.81	0.00	0.21	0.20	0.41
Mar.	-1	21.58	14.07	0	10.34	13.34	0.00	0.81	0.39	0.61	0.00	0.20	0.15	0.36
2007-08 Apr.	0	19.88	8.33	1	8.64	7.60	0.50	0.68	0.22	0.78	0.25	0.17	0.20	0.61
May	0	20.08	6.96	1	8.84	6.23	0.50	0.69	0.18	0.82	0.25	0.17	0.20	0.63
Jun.	0	22.17	2.42	1	10.93	1.69	0.50	0.86	0.05	0.95	0.25	0.21	0.24	0.70
Jul.	-1	22.34	0.73	0	11.10	0.00	0.00	0.87	0.00	1.00	0.00	0.22	0.25	0.47
Aug.	-1	20.35	6.31	0	9.11	5.58	0.00	0.71	0.16	0.84	0.00	0.18	0.21	0.39
Sep.	-1	22.08	6.41	0	10.85	5.68	0.00	0.85	0.16	0.84	0.00	0.21	0.21	0.42
Oct.	-1	23.02	6.03	0	11.78	5.30	0.00	0.92	0.15	0.85	0.00	0.23	0.21	0.44
Nov.	-1	22.84	6.98	0	11.61	6.25	0.00	0.91	0.18	0.82	0.00	0.23	0.20	0.43
Dec.	-1	23.36	7.50	0	12.13	6.77	0.00	0.95	0.20	0.80	0.00	0.24	0.20	0.44
Jan.	0	24.00	6.69	1	12.76	5.96	0.50	1.00	0.17	0.83	0.25	0.25	0.21	0.71
Feb.	0	23.16	7.06	1	11.92	6.33	0.50	0.93	0.18	0.82	0.25	0.23	0.20	0.69
Mar.	0	21.52	7.37	1	10.28	6.64	0.50	0.81	0.19	0.81	0.25	0.20	0.20	0.65
2008-09 Apr.	-1	22.33	6.18	0	11.09	5.45	0.00	0.87	0.16	0.84	0.00	0.22	0.21	0.43
May	-1	22.88	6.70	0	11.64	5.97	0.00	0.91	0.17	0.83	0.00	0.23	0.21	0.43
Jun.	-1	21.91	7.80	0	10.67	7.07	0.00	0.84	0.20	0.80	0.00	0.21	0.20	0.41

Jul.	-1	19.95	8.85	0	8.71	8.12	0.00	0.68	0.23	0.77	0.00	0.17	0.19	0.36
Aug.	-1	21.53	9.00	0	10.29	8.27	0.00	0.81	0.24	0.76	0.00	0.20	0.19	0.39
Sep.	-1	19.96	10.57	0	8.72	9.84	0.00	0.68	0.28	0.72	0.00	0.17	0.18	0.35
Oct.	0	20.12	10.70	1	8.88	9.97	0.50	0.70	0.29	0.71	0.25	0.17	0.18	0.60
Nov.	0	19.43	6.92	1	8.19	6.19	0.50	0.64	0.18	0.82	0.25	0.16	0.21	0.62
Dec.	0	19.83	5.94	1	8.59	5.21	0.50	0.67	0.15	0.85	0.25	0.17	0.21	0.63
Jan.	0	19.67	4.34	1	8.43	3.61	0.50	0.66	0.10	0.90	0.25	0.17	0.22	0.64
Feb.	0	20.18	4.13	1	8.94	3.40	0.50	0.70	0.10	0.90	0.25	0.18	0.23	0.65
Mar.	0	19.45	4.19	1	8.21	3.46	0.50	0.64	0.10	0.90	0.25	0.16	0.22	0.64
2009-10 Apr.	1	21.75	3.46	2	10.51	2.73	1.00	0.82	0.08	0.92	0.50	0.21	0.23	0.94
May	1	21.07	3.18	2	9.83	2.45	1.00	0.77	0.07	0.93	0.50	0.19	0.23	0.92
Jun.	1	20.98	3.23	2	9.74	2.50	1.00	0.76	0.07	0.93	0.50	0.19	0.23	0.92
Jul.	0	21.02	3.21	1	9.78	2.48	0.50	0.77	0.07	0.93	0.25	0.19	0.23	0.67
Aug.	0	19.96	3.22	1	8.72	2.49	0.50	0.68	0.07	0.93	0.25	0.17	0.23	0.65
Sep.	0	19.74	3.25	1	8.50	2.52	0.50	0.67	0.07	0.93	0.25	0.17	0.23	0.65
Oct.	0	18.95	3.24	1	7.71	2.51	0.50	0.60	0.07	0.93	0.25	0.15	0.23	0.63
Nov.	0	19.26	3.23	1	8.03	2.50	0.50	0.63	0.07	0.93	0.25	0.16	0.23	0.64
Dec.	0	17.94	3.29	1	6.70	2.56	0.50	0.52	0.07	0.93	0.25	0.13	0.23	0.61
Jan.	-1	17.38	3.26	0	6.14	2.53	0.00	0.48	0.07	0.93	0.00	0.12	0.23	0.35
Feb.	-1	17.11	3.22	0	5.87	2.49	0.00	0.46	0.07	0.93	0.00	0.11	0.23	0.35
Mar.	-1	16.87	3.59	0	5.64	2.86	0.00	0.44	0.08	0.92	0.00	0.11	0.23	0.34
2010-11 Apr.	-1	14.85	3.56	0	3.61	2.83	0.00	0.28	0.08	0.92	0.00	0.07	0.23	0.30
May	-1	15.33	3.88	0	4.09	3.15	0.00	0.32	0.09	0.91	0.00	0.08	0.23	0.31
Jun.	-1	15.09	5.24	0	3.85	4.51	0.00	0.30	0.13	0.87	0.00	0.08	0.22	0.29
Jul.	-1	15.69	5.53	0	4.45	4.80	0.00	0.35	0.14	0.86	0.00	0.09	0.22	0.30
Aug.	-1	15.72	5.22	0	4.48	4.49	0.00	0.35	0.13	0.87	0.00	0.09	0.22	0.31
Sep.	-1	15.59	5.62	0	4.35	4.89	0.00	0.34	0.14	0.86	0.00	0.09	0.21	0.30
Oct.	-1	17.40	6.49	0	6.17	5.76	0.00	0.48	0.17	0.83	0.00	0.12	0.21	0.33
Nov.	-1	16.47	6.91	0	5.23	6.18	0.00	0.41	0.18	0.82	0.00	0.10	0.21	0.31
Dec.	-1	17.88	6.75	0	6.64	6.02	0.00	0.52	0.17	0.83	0.00	0.13	0.21	0.34
Jan.	-1	16.60	6.54	0	5.36	5.81	0.00	0.42	0.17	0.83	0.00	0.10	0.21	0.31
Feb.	-1	16.85	6.73	0	5.61	6.00	0.00	0.44	0.17	0.83	0.00	0.11	0.21	0.32
Mar.	-1	16.40	7.23	0	5.17	6.50	0.00	0.40	0.19	0.81	0.00	0.10	0.20	0.30
2011-12 Apr.	-1	17.84	6.57	0	6.61	5.84	0.00	0.52	0.17	0.83	0.00	0.13	0.21	0.34
May	-1	17.20	7.23	0	5.96	6.50	0.00	0.47	0.19	0.81	0.00	0.12	0.20	0.32
Jun.	-1	17.38	7.48	0	6.14	6.75	0.00	0.48	0.20	0.80	0.00	0.12	0.20	0.32
Jul.	-1	16.71	7.62	0	5.47	6.89	0.00	0.43	0.20	0.80	0.00	0.11	0.20	0.31
Aug.	-1	16.93	7.97	0	5.69	7.24	0.00	0.45	0.21	0.79	0.00	0.11	0.20	0.31
Sep.	-1	16.27	8.11	0	5.03	7.38	0.00	0.39	0.21	0.79	0.00	0.10	0.20	0.30
Oct.	-1	14.97	8.26	0	3.73	7.53	0.00	0.29	0.22	0.78	0.00	0.07	0.20	0.27
Nov.	-1	15.25	8.58	0	4.01	7.85	0.00	0.31	0.23	0.77	0.00	0.08	0.19	0.27
Dec.	-1	15.77	9.04	0	4.53	8.31	0.00	0.35	0.24	0.76	0.00	0.09	0.19	0.28
Jan.	1	14.88	8.92	2	3.64	8.19	1.00	0.28	0.24	0.76	0.50	0.07	0.19	0.76

Feb.	1	14.08	8.81	2	2.84	8.08	1.00	0.22	0.23	0.77	0.50	0.06	0.19	0.75
Mar.	1	12.93	9.17	2	1.69	8.44	1.00	0.13	0.24	0.76	0.50	0.03	0.19	0.72
2012-13 Apr.	1	13.42	8.62	2	2.18	7.89	1.00	0.17	0.23	0.77	0.50	0.04	0.19	0.74
May	1	13.52	8.27	2	2.28	7.54	1.00	0.18	0.22	0.78	0.50	0.04	0.20	0.74
Jun.	1	15.15	8.14	2	3.91	7.41	1.00	0.31	0.21	0.79	0.50	0.08	0.20	0.77
Jul.	1	13.88	8.05	2	2.64	7.32	1.00	0.21	0.21	0.79	0.50	0.05	0.20	0.75
Aug.	1	13.50	7.99	2	2.26	7.26	1.00	0.18	0.21	0.79	0.50	0.04	0.20	0.74
Sep.	1	13.66	7.92	2	2.42	7.19	1.00	0.19	0.21	0.79	0.50	0.05	0.20	0.75
Oct.	1	13.16	8.00	2	1.92	7.27	1.00	0.15	0.21	0.79	0.50	0.04	0.20	0.74
Nov.	1	12.92	8.04	2	1.68	7.31	1.00	0.13	0.21	0.79	0.50	0.03	0.20	0.73
Dec.	1	11.38	8.05	2	0.14	7.32	1.00	0.01	0.21	0.79	0.50	0.00	0.20	0.70
Jan.	1	13.11	8.00	2	1.87	7.27	1.00	0.15	0.21	0.79	0.50	0.04	0.20	0.73
Feb.	1	12.88	7.80	2	1.64	7.07	1.00	0.13	0.20	0.80	0.50	0.03	0.20	0.73
Mar.	1	14.18	7.90	2	2.94	7.17	1.00	0.23	0.21	0.79	0.50	0.06	0.20	0.76
2013-14 Apr.	1	12.98	7.53	2	1.74	6.80	1.00	0.14	0.20	0.80	0.50	0.03	0.20	0.73
May	1	13.67	7.29	2	2.43	6.56	1.00	0.19	0.19	0.81	0.50	0.05	0.20	0.75
Jun.	1	12.98	7.24	2	1.74	6.51	1.00	0.14	0.19	0.81	0.50	0.03	0.20	0.74
Jul.	-1	12.64	7.76	0	1.41	7.03	0.00	0.11	0.20	0.80	0.00	0.03	0.20	0.23
Aug.	-1	12.31	9.90	0	1.07	9.17	0.00	0.08	0.27	0.73	0.00	0.02	0.18	0.20
Sep.	-1	13.43	9.97	0	2.19	9.24	0.00	0.17	0.27	0.73	0.00	0.04	0.18	0.23
Oct.	1	13.41	9.03	2	2.18	8.30	1.00	0.17	0.24	0.76	0.50	0.04	0.19	0.73
Nov.	1	14.62	8.45	2	3.38	7.72	1.00	0.27	0.22	0.78	0.50	0.07	0.19	0.76
Dec.	1	14.69	8.16	2	3.45	7.43	1.00	0.27	0.21	0.79	0.50	0.07	0.20	0.76
Jan.	-1	14.00	8.19	0	2.76	7.46	0.00	0.22	0.22	0.78	0.00	0.05	0.20	0.25
Feb.	-1	14.10	8.21	0	2.86	7.48	0.00	0.22	0.22	0.78	0.00	0.06	0.20	0.25
Mar.	-1	13.04	8.37	0	1.80	7.64	0.00	0.14	0.22	0.78	0.00	0.04	0.19	0.23

Source: Autocues Estimation

A-Min: means actual –minimum and the subscript 1, 2, 3 indicates monetary policy, money supply (M_3) and call money rate respectively.